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Huber, W. G. (1958) Vet. Med., *53*, 55.
Link, R. P. et al (1957) J. Amer. vet. med. Ass., *130*, 137.

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The Assessment of Antimycotic Agents for Cattle Ringworm *Trichophyton verrucosum*

BY

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SUMMARY.—1. Guinea-pigs experimentally infected with T. verrucosum *were found unsuitable for the assessment of topical antimycotic preparations due to spontaneous cure within 26 days of inoculation.*

2. Multiple lesions produced on calves by intradermal injection of spore suspensions of T. verrucosum *were found to provide satisfactory test conditions for topical antimycotic agents.*

3. Some of the difficulties inherent in clinical trials on natural outbreaks are discussed.

4. None of the antimycotic agents tested influenced the duration of the experimental lesions.

Introduction

THOUGH many drugs are known to exhibit antimycotic activity *in vitro*, few, if any, have been assessed biologically under controlled conditions. To test some of the agents discussed in a previous paper (McPherson, 1959) experimental infections and clinical trial methods were employed. The methods and results are recorded below. The guinea-pig was recommended by Ormsby and Montgomery (1948), after a review of experimentalists' reports, as the laboratory animal giving the most constant response to inoculation with a virulent dermatophyte. Guinea-pigs were first employed but soon discarded in favour of cattle.

Guinea-pigs

Method. Four female albino guinea-pigs of approximately 350 g. bodyweight were infected with *T. verrucosum* at 6 sites on each side of the trunk. Animals 1, 3 and 4 were inoculated by lightly rotating the end of a 2-mm. pasteur pipette, containing chlamydospores until an imprint was made on the skin without effusion of blood. Number 2 was injected intradermally with 0·05 ml. of a suspension of chlamydospores and hyphal fragments (5×10^6 chlamydospores per ml.). The resulting lesions were measured with callipers and paired, one being a control while the other was treated. 1 per cent. benzalkonium chloride solution or 1 per cent. cetrimide was scrubbed into the lesions on the eleventh, sixteenth and nineteenth days after inoculation. Subsequently a further 8 guinea-pigs were inoculated by pipette scarification and other agents tested by the same method.

Results. In Table I the data concerning guinea-pigs Numbers 1, 2, 3 and 4 is recorded. (See overleaf.)

Lesions developed at each site on these guinea-pigs, though the size varied for perhaps a number of reasons, *e.g.* strain of dermatophyte, severity and area of scarification which sometimes it was difficult to limit to 2 mm. In the second batch of 8 guinea-pigs lesion production was erratic, possibly because of an over-anxiety to avoid severe skin damage since a rather tenacious central necrotic area in all the lesions on the first 4 was thought to confuse the final picture. Intradermal injection on the other hand gave uniform if small lesions on the 1 animal so injected. The appearance of the lesions was as described by previous workers. About the nineteenth day many lesions became ulcers, the scabs having fallen off during treatment, or been licked off by the animal. Healing was complete by the twenty-sixth day except for the hairless state of the skin which did not persist very long.

Both the quaternary ammonium compounds under test on the first 4 guinea-pigs halted the radial extension of the treated lesions while the controls continued to increase for a few days. All treated and control lesions, however, healed at the same time.

TABLE I
THE ANTIMYCOTIC ACTIVITY OF BENZALKONIUM CHLORIDE AND CETRIMIDE B.P. *in vivo*

Treatment	Strain of *Trichophyton verrucosum*	Diameter of lesions at 11 days after inoculation		Diameter of lesions at 16 days after inoculation		Diameter of lesions at 19 days after inoculation		Diameter of lesions at 24 days after inoculation		Guinea pig No.
		mm. Cont.	mm. Treat.	mm. Cont.	mm. Treat.	mm. Cont.	mm. Treat.	mm. Cont.	mm. Treat.	
1 per cent. Benzalkonium Chloride on 11th, 16th and 19th days	SP 12	8	8	10	7	11	7	H	H	1
	SP 11	8	8	10	7	16	7	Small scab	H	
	SP 15	12	12	16	10	16	10	Small scab	H	
	SP 22	9	9	16	6	16	5	H	H	3
	SP 46	7	3	16	H	16	H	H	H	
	SP 50	6	6	16	6	16	5	H	H	
	SP 45	10	8	13	10	16	5	H	H	4
	SP 47	12	12	11	8	14	4	H	H	
	SP 70	12	12	18	8	16	4	H	H	
	C 516	3	3	3	H	H	H	H	H	2
	C 516	3	3	3	H	H	H	H	H	
	C 516	3	3	3	H	H	H	H	H	
1 per cent. Cetrimide on 11th, 16th and 19th days	SP 7	10	3	14	3	12	H	H	H	1
	SP 6	10	10	12	10	14	5	H	H	
	SP 3	10	10	12	10	14	8	H	H	
	SP 13	3	3	H	H	H	H	H	H	3
	SP 19	8	8	16	8	16	4	H	H	
	SP 20	10	10	16	10	16	10	H	H	
	SP 1	7	2	8	H	10	H	H	H	4
	SP 33	10	6	11	6	13	4	H	H	
	SP 34	12	9	12	8	16	5	H	H	
	F	3	3	8	3	8	H	H	H	2
	F	3	3	8	3	8	H	H	H	
	F	3	3	8	3	8	H	H	H	

On the second group of 8 guinea-pigs the results of treatment with a number of agents were similarly inconclusive. While some stopped the extension of lesions and others did not, all lesions again healed about the twenty-sixth day.

Cattle

(*a*) Experimentally Infected Calves

Method. A suspension of chlamydospores and hyphal fragments (5×10^6 chlamydospores per ml.) in distilled water was prepared in a Griffith tube from 14-day cultures of several strains of *T. verrucosum* grown on nutrient agar (Austwick, 1954). Calf A was inoculated at 36 sites by rubbing the spores into the skin with a glass rod while Calf B received 0·1 ml. of the suspension intradermally from a dental syringe, through a short fine needle, on similar sites (Fig. 1). The resulting lesions were subjected (in duplicate on Calf A and in triplicate on Calf B) to regular treatments with a number of antimycotic agents. Scabs, when thick, were removed during the application of the agents. The size and duration of the lesions and the times of treatment with various drugs is shown in Figs. 2 and 3. Untreated and water treated controls were maintained on each animal.

Thirty-one weeks after the primary inoculation each calf was reinjected on 12 old lesion sites and 12 fresh sites on the trunk. Two sites on each ear and one above each orbit were also injected intradermally. Two susceptible calves, C and D, inoculated on 36 sites each acted as controls on the infectivity of the spore suspension.

Results. These are shown in Figs. 2 and 3, page 542.

Lesion Production

Infection was less reliable by the rubbing method and lesions were slower in appearing. Only 17 sites were successfully infected on Calf A. On Calf B 32 lesions, of fairly uniform size, shape and texture, were obtained. The larger size of lesion on Calf A was considered to be due to the wide area of inoculation. On Calves C and D, later inoculated, 100 per cent. success in establishing infection was obtained. On these the lesions persisted for 10 and 11 weeks respectively. On all 4 calves the lesions were typical of *T. verrucosum*.

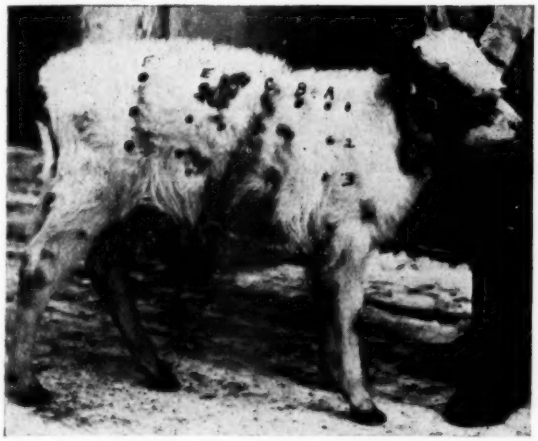
No ringworm lesions resulted from the inoculation of the recovered Calves A and B, though small firm swellings were present for a time at the inoculated sites. These swellings were smallest (4 mm.) on the ear and periorbital sites. Calves C and D which acted as controls developed typical lesions on all sites.

Drug Assessment

It is clear from Figs. 2 and 3 that none of the agents tested influenced the duration of the lesions.

(*b*) Clinical Trial

On September 2nd, 1957, a yearling heifer with very extensive *T. verrucosum* lesions, joined a group



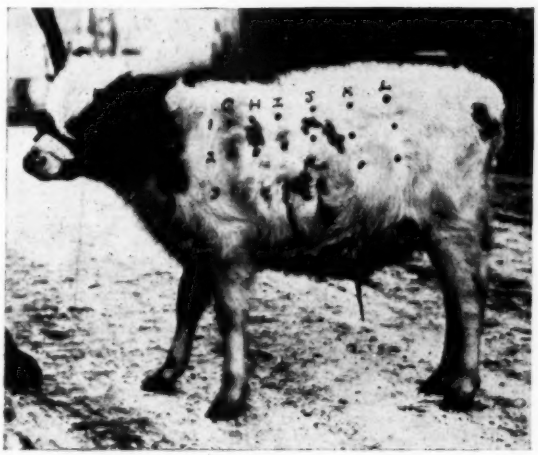


FIG. 1.—Sites of inoculation with *T. verrucosum*.

of 72 grazing Ayrshire cattle of from 2 months to 10 years of age, and remained almost 24 hours in contact with them. In Fig. 4 the sequence of events is recorded. The lesions on the first 6 animals detected were obvious and must have been present for at least a week. Thereafter a close watch was kept on the other cattle. It was not possible in the prevailing circumstances to handle the skin of all the cattle at risk, with the result that some lesions may have gone undetected for some time as, for example, all the lesions on F.1, F.2 and F.3. The same may be true of some of the small lesions found on animals already under treatment. Such lesions are recorded in small blocks attached to the main one used to indicate infection of individuals in Fig. 5, *e.g.* D.12, D.17, D.9 and E.9. The various agents used and the frequency of their application are also shown in the same figure. All treatments were by topical application except dimidium bromide given by subcutaneous injection to animals M.10 and C.16.

Results. These are recorded in Fig. 4, page 543.

Lesions were present for an average of 9 weeks from detection until recovery of the animal, the shortest time being 4 weeks and the longest 12 weeks. If it were assumed that all animals became infected and developed lesions at the same time, though the latter were undetected for long periods on some animals due to long hair, etc., then the average duration, if calculated from the sixth week, would be 12·8 weeks. This uncertainty is one of the difficulties of dealing with natural outbreaks. It was noticeable that with one exception (D.11) the lesions found at a late stage on treated animals healed at the same time as lesions which had prolonged dressings.

Though 2 animals, E.2 and D.18, were apparently cured by 2 per cent. cetrimide, the others under this treatment at the tenth week from infection were not making progress. A change to 20 per cent. cetrimide, however, for these (except D.17) and some fresh cases proved of no avail. With the exception of D.9, animals treated with creosote did not make satisfactory progress and a change of treatment was made. Two weeks' treatment with monosulfiram was not improving C.16 when topical treatment ceased to enable a test of the action of dimidium bromide to be carried out on this animal and M.10. This was unsuccessful. Resort was then made to a dressing of 25 per cent. acetic acid solution slightly coloured with Brilliant Green—a prescription which had a reputation for efficacy. It appears from the graph that by the time it was used the outbreak was on the wane.

Discussion

The duration of the lesions in this clinical trial group was comparable to the experience of Ford (1956). The lesions on his winter group existed for 10 weeks while on his summer group the average was 17 weeks, giving an over-all average of 15·5 weeks. The lesions on Calves A and B persisted for 14 weeks and 13½ weeks respectively, while Calves C and D had lesions for 10 and 11 weeks each. The experimental infection induced by intradermal injection therefore persisted for a period comparable to natural infections. They also simulated the natural lesions in every other respect. With up to 36 lesions on one animal it is possible to provide adequate control lesions and to test several drugs in at least triplicate on one animal, thereby avoiding the individual differences in host reaction to the parasite, which must disturb trials where controls are based on untreated animals unless large numbers are employed. On the 4 experimental animals the duration of lesions varied from 10 to 14 weeks on different individuals. Some of Ford's (1956) animals recovered after only a few weeks as did some in the natural infections here recorded. These recoveries cannot be attributed to the agents employed in treatment in view of the evidence against the efficiency of any of the drugs. Without the evidence of the animals A and B one would have been tempted to credit 25 per cent. acetic acid solution with therapeutic possibilities. Even with added benzalkonium chloride, however, the acid solution failed to cure the experimental calves. These conclusions are in agreement with the inde-

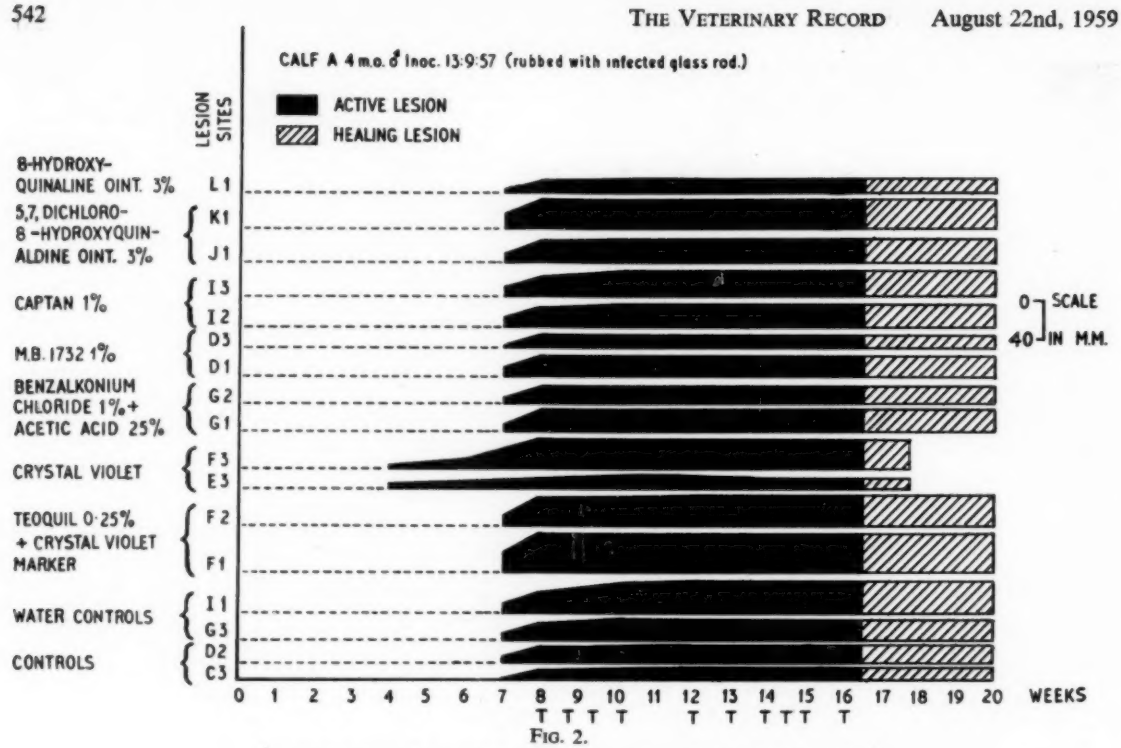

CALF A 4 m.o. ♂ Inoc. 13:9:57 (rubbed with infected glass rod.)
ACTIVE LESION
HEALING LESION
LESION SITES
8-HYDROXY-QUINALINE OINT. 3%
L1
5,7, DICHLORO-8-HYDROXYQUIN-ALDINE OINT. 3%
K1
J1
CAPTAN 1%
I3
I2
M.B. 1732 1%
D3
D1
BENZALKONIUM CHLORIDE 1%+ ACETIC ACID 25%
G2
G1
CRYSTAL VIOLET
F3
E3
TEOQUIL 0·25% + CRYSTAL VIOLET MARKER
F2
F1
WATER CONTROLS
I1
G3
CONTROLS
D2
C3
0 SCALE 40 IN M.M.
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 WEEKS
T T T T T T T T T T

FIG. 2.

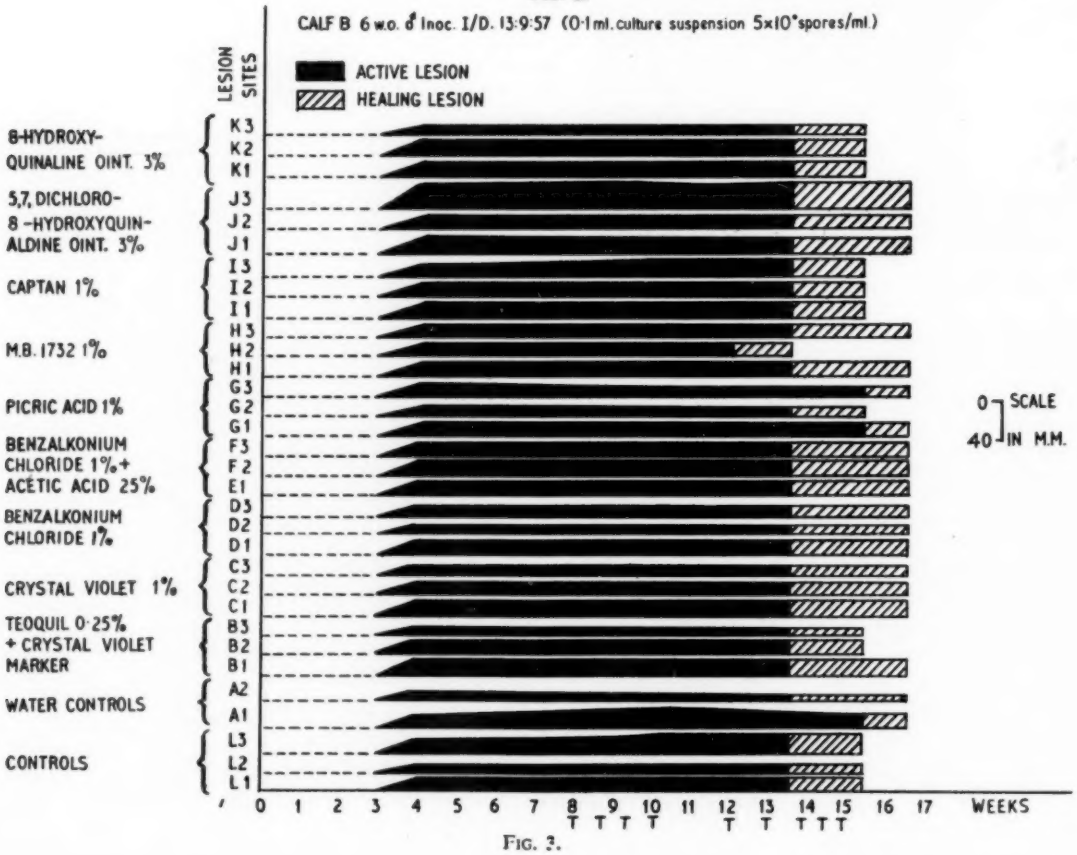

CALF B 6 w.o. ♂ Inoc. I/D. 13:9:57 (0·1 ml. culture suspension 5×10⁶ spores/ml.)
ACTIVE LESION
HEALING LESION
LESION SITES
8-HYDROXY-QUINALINE OINT. 3%
K3
K2
K1
5,7, DICHLORO-8-HYDROXYQUIN-ALDINE OINT. 3%
J3
J2
J1
CAPTAN 1%
I3
I2
I1
M.B. 1732 1%
H3
H2
H1
PICRIC ACID 1%
G3
G2
G1
BENZALKONIUM CHLORIDE 1%+ ACETIC ACID 25%
F3
F2
E1
BENZALKONIUM CHLORIDE 1%
D3
D2
D1
CRYSTAL VIOLET 1%
C3
C2
C1
TEOQUIL 0·25% + CRYSTAL VIOLET MARKER
B3
B2
B1
WATER CONTROLS
A2
A1
CONTROLS
L3
L2
L1
0 SCALE 40 IN M.M.
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 WEEKS
T T T T T T T T T T

FIG. 3.

pendent findings of O'Brien *et al.* (1958) and Austwick (1958).

The resistance of Calves A and B to reinfection indicates that a reaction on the part of the host eliminated the infection and not a diminution in vigour of the dermatophyte. Immunity of cattle has been reported by Hoerlein (1945). The variation in the duration of lesions on different individuals probably reflects the development of immunity. This variant, together with the unknown age of the lesions in most clinical cases of the disease and other uncontrolled and perhaps unknown factors inseparable from clinical trials on natural field infections, renders assessment of antimycotic agents by this means hazardous, as has been the experience of several authors, *e.g.* O'Brien *et al.* (1958). Multiple lesions on calves produced by intradermal injection of virulent spores provide superior biological testing facilities for topical antimycotic agents.

From the practical viewpoint it can be assumed that if treatment of a group of animals is not instituted until infection is widespread, as assessed by visual inspection, and has been present long enough to stimulate the average owner to action, any agent used may well be credited with merit. Whether in view of the present unsatisfactory state of knowledge regarding therapeutic agents it is worth the risk of infecting personnel in the process of treatment is doubtful. The best that can be said is that surface dressings may

(*Concluded at foot of col.* 1 *overleaf*)

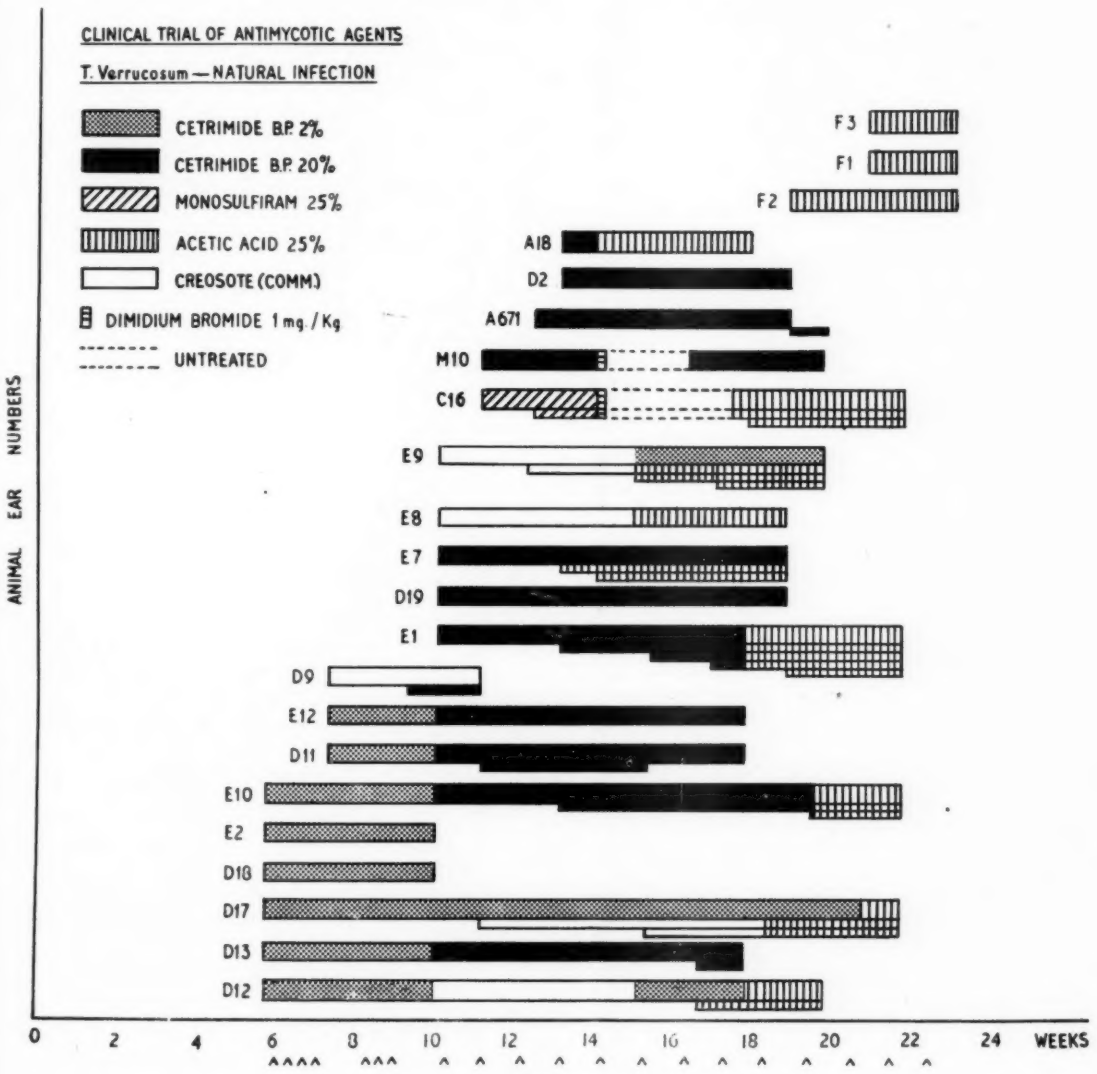


FIG. 4.

Bovine Abortion in the South-West—The Present Position *

BY

J. G. WILSON

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THE problem of bovine abortion and stillbirth is one that is worrying many veterinary surgeons and stockowners in the South-West and in other parts of the United Kingdom. Viewing the problem in the South-West over the past 15 years an analogy may be drawn to the " Dance of the Seven Veils "—when the veil of Brucella was drawn aside, Trichomonas was revealed, then vibriosis was discovered in the last decade and in the immediate present mycotic abortion is becoming prominent. What will the other veils reveal ?

Incidence of Abortion

In the early war years when the writer began to specialise in diseases of reproduction (and S.19 vaccine was just introduced into this country), Brucella storms were so rife that herds could be classified into 3 categories—those which had got it, those which had just had it and those which were just going to get it ! At that time the abortion rate for the country was probably of the order of at least 10 per cent. of all pregnancies. Holt (1952) surveyed the abortion rate in cattle in Devon artificially inseminated during 1946–9 and found a reduction from 6·18 to 2·3 per cent. which he correlated with the increase in the numbers of females of breeding age which had been protected by S.19 vaccination. Clarke (1949) also reported a fall in the abortion rate in artificially inseminated cattle in Somerset. During this time trichomoniasis, which was rife in Somerset but comparatively rare in Devon and even rarer in Cornwall, was being controlled by the change from natural to artificial service. The disease is now virtually extinct in this country. In more recent times Withers (1955) in a survey concerning disease losses in Surrey, Berkshire and Wiltshire found that 1 in 14 (approximately 7 per cent) of all pregnancies ended in abortion or stillbirth. The author has no recent figures for the South-West but from discussion with Veterinary Officers in charge of the South-West A.I. Centres it seems probable that the incidence of abortion is at present above the 2 per cent. level of 1949.

Causes of Abortion in the South-West

Lawson and McKinnon (1952) reviewed the results of examinations on 1,302 foetuses carried out in 1947–51. They found 16·7 per cent. positive for *Brucella abortus* and 8·6 per cent. positive for *Vibrio fetus*: other specific organisms which might have been implicated in the abortion rate varied between 5 and 10 per cent. in the different years ; 10 to 15 per cent. were sterile and the remainder were too contaminated to come to a conclusion. The results of the examinations of 188 foetuses and foetal material samples examined at Starcross in a recent 12-month period show :—

Negative	147 (79 per cent.)
Brucella abortus	25 (13 „ „)
Vibrio fetus	1
C. pyogenes	2
Diphtheroids	2
Listeria	1
Erysipelothrix	1
Salmonella	1
Tuberculosis	1
Non-haemolytic Strep. ...	1
Staphlococcus	1
Mycotic abortion	2 (1 Mucor, 1 Aspergillus)

Further information on the incidence of Brucella abortion and abortion in general has been obtained by an analysis of forms sent in with blood samples from recently aborted cows : 1,500 of these have been completed and tabulated to date.

From these figures it can be seen that :—

64 per cent. were *negative* or positive at 1/10 only and of these 27 per cent. had been vaccinated with S.19.

10 per cent. were *positive* up to 1/20 only, of these 48·6 per cent. had been vaccinated with S.19.

26 per cent. were *positive* at 1/40 or over and of these 28 per cent. had been vaccinated with S.19.

Twenty-nine per cent. only of the total cows had been vaccinated S.19. This suggests that at least a third of the reactions at up to 1/20 were probably due to vaccination.

* A paper presented to the June 1958 meeting of the Western Counties Veterinary Association.

The Assessment of Antimycotic Agents for Cattle Ringworm—*Concluded.*

curtail the extension of recent lesions and limit the dissemination of infective material.

Acknowledgments. I wish to thank Professor G. F. Boddie for the facilities to carry out this work, Mr. R. S. Hood, F.I.B.P., F.I.S.T., for the photographs, and Mr. R. Brown, A.I.S.T., for his technical assistance.

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TABLE I
TABLE OF RESULTS OF BRUCELLA AGGLUTINATION TESTS

Titre	Total number samples	Status of animal		
		Vaccinated	Not vaccinated	? vaccinated
Negative and 1/10	957 (63·8%)	258 (27%)	580 (60·6%)	119 (12·4%)
1/20	145 (9·6%)	66 (48·6%)	60 (44·8%)	19 (6·6%)
1/40	83 (5·5%)	38 (45·8%)	31 (37·4%)	14 (16·8%)
1/80	67 (4·4%)	24 (36%)	35 (52%)	8 (12%)
1/160	72 (4·8%)	12 (18%)	51 (70·8%)	9 (11·2%)
1/320 and over	176 (11·7%)	38 (21·6%)	114 (64·8%)	24 (13·6%)
Total	1,500 (100%)	436 (29%)	871 (58%)	193 (13%)

Other information obtained from analysis of these forms included :—

Breed of Cow :

South Devon ...	359	= 24	per cent.
Friesian ...	359	= 24	,, ,,
Guernsey ...	204	= 13·9	,, ,,
Shorthorn ...	134	= 9	,, ,,
Devon	104	= 7	,, ,,
Ayrshire ...	97	= 6·6	,, ,,
Cross	89	= 6	,, ,,
Jersey	79	= 5·4	,, ,,
Other Breeds ...	·75	= 4·1	,, ,,
	1,500	= 100	,, ,,

The animals which aborted on a previous occasion amounted to 5·2 per cent. of the total.

Methods of Service :

A.I.	= 932	= 60·2	per cent.
Bull	= 275	= 18·3	,, ,,
Not known	= 293	= 21·5	,, ,,
	1,500		

The A.I. figure appears rather high, but this probably correlates with the use of A.I. in the area. These figures tend to rule out the possibility of a disease spread by natural service only being responsible for a large percentage of the abortions.

Herd Incidence of Abortion :

Details of herd incidence were indicated on 560 of the forms. The number of abortions in the herd over the past 12 months was related to the agglutination titre of serum samples in the table opposite:—

From Table II it will be seen that in 68 per cent. of the outbreaks, 1 cow only had aborted, and only 17 per cent. of the cases were positive to the serum agglutination test for Brucella. It seems possible, therefore, that many of these single abortions were due to an accident or an endocrine or other instability of the pregnancy. In 19·5 per cent. of the herds 2 or 3 cows had aborted and 27·5 per cent. of these were Brucella positive. The remaining 12·5 per cent. of the herds had a more serious problem with 4 or more cows aborting, and 70 per cent. of these were Brucella positive. Most abortions occurred when the cows were 5 years old. The foetuses were generally aborted at the 7th month of pregnancy.

Diagnosis of Brucellosis

If *Brucella abortus* is isolated from the foetal abomasum, the brain or the membranes, the organism is very probably the cause of the abortion, but this is not absolutely certain. In the case of the blood serum agglutination test, a positive titre at 1/40 dilution and over may mean that the abortion was caused by Brucella infection, but the positive titre may have been caused by a virulent Brucella infection at some earlier date (the present abortion being due to some other factor) ; again, the titre may be due to S.19 vaccination, particularly if adult or repeat vaccination has been carried out. So in

TABLE II
HERD INCIDENCE OF ABORTION

Number of abortions in herd	Negative (and 1/10)	Suspicious (1/20 non-vaccinated) (1/40 vaccinated)	Positive (1/40 non-vaccinated) and (1/80 vaccinated) over 6
Only one	272/381 = 72%	43/381 = 11%	66/381 = 17%
381/560 = 68%			
Two or three	67/109 = 61·5%	12/109 = 11%	30/109 = 27·5%
109/560 = 19·5%			
Four or more	14/70 = 20%	7/70 = 10%	49/70 = 70%
70/560 = 12·5%			
Total herds 560	353/560 = 63%	62/650 = 11%	145/560 = 26%

the diagnosis of Brucella abortion we have the problem of sorting out virulent infection reactions from those caused by S.19 vaccine. If blood tests are taken at, say, 10 and 21 days after the abortion, a rising titre is a strong indication of virulent infection.

Dr. Kerr (1955) in Northern Ireland has adapted the vaginal mucus agglutination test, used for Trichomonas and Vibrio diagnosis, for the detection of Brucella agglutinins and has found it useful in picking out virulent infection from S.19 reactions. He has since found that, taken in conjunction with the milk whey agglutination test, it is a most effective method of distinguishing natural infections from adult vaccination. He found that the vaginal mucus test was not affected by S.19 and that Brucella could be isolated from 50 per cent. of the mucus samples up to 3 weeks after abortion. He also found that S.19 had only a very slight transient effect on the whey agglutination test which disappeared in 3 to 6 weeks after vaccination. More recently Marr and Williams (1958) have found that a large percentage of individual cows with a positive milk ring test and a positive vaginal mucus test were excreting Brucella in their milk, and they suggested that isolation of Brucella from milk is just as efficient as the usual guinea-pig inoculation. They also found that although the vaginal mucus was affected for up to 15 weeks after S.19 vaccination the milk ring test was practically unaffected. Ogonowski and McDiarmid (1954) found the rapid plate agglutination test the most effective Brucella milk test and that plate, ring and whey tests were not affected by calfhood vaccination. We find that adult S.19 vaccination appears to have a slight effect on the milk ring test which does not persist as long as the effect on serum titres ; we also find that the milk ring test a useful guide as to whether or not to carry out whey agglutination and culture tests. We find no evidence to suggest that S.19 affects whey or vaginal mucus agglutination tests.

Before leaving the subject of brucellosis I would like to refer to the phenomenon of the very occasional apparent failure of S.19 to protect against field infection. Of course the immunity developed after this and most types of vaccination is relative and probably 90 to 100 per cent. of females in a vaccinated herd are protected. The latest figures from the A.R.C. at Compton indicate that a single calfhood vaccination gives undiminished protection against a challenge dose for at least 5 pregnancies and so, if the initial calf vaccination has been efficient, there should be no need of adult vaccination. My impression is that rather poorer results are often obtained by a vaccine programme which is not initiated until after virulent brucellosis has already broken out in the herd. Possibly many of the females are already incubating the disease and a blood test may fail to reveal this, especially when it is carried out during pregnancy. A herd blood test in the case of recent infection may give very misleading results as many of the pregnant females giving a negative titre may subsequently abort and prove positive. Where there appears to be a herd vaccine breakdown—and this seems to be common in Jerseys—we often wonder if a more virulent than usual strain of Brucella is responsible, but another explanation occurred to me recently when investigating a herd breakdown in Galloways ; it was that of stress. The abortions occurred on more then one farm about a month after the animals had been put through the crush : there had also been a period of very cold weather with an east wind.

Vibriosis

The connexion between the isolation of *Vibrio fetus* from aborted foetuses and placentae and infertility was first described in 1947 by Plastridge and Williams, and linked with enzootic sterility in Holland in 1949 by Sjollema, Stegenga and Terpstra who first applied the mucus agglutination test to this disease.

In 1956 Akkermans, Terpstra and Van Waveren described a type of Vibrio which was intermediate between the pathogenic *Vibrio fetus* (Catalase positive, H_2S Neg.) and the non-pathogenic saprophyte *Vibrio bubulus* (Cat. Neg., H_2S Pos.), this type of Vibrio was Cat. Pos., H_2S Pos. It was found in the stomach of sporadic abortion foetuses and was not associated with a herd infertility or with reactions to the mucus agglutination test.

In 1956–7 out of 50 herds investigated for infertility in the South-West, 19 on natural service were mucus-tested for Vibrio ; 3 of these were considered positive, 2 were inconclusive and the rest (14) were negative. Only 1 foetus out of 188 in the same period was positive for Vibrio and that was in a herd already positive to the mucus agglutination test. It is concluded, therefore, that vibriosis is not a major problem in the South-West.

The abortion rate in a Vibrio infected herd is much lower than in a Brucella storm and is usually 5 to 10 per cent.

Vibriosis is diagnosed by bacteriological examination of the aborted foetus or by a mucus agglutination test 10 to 14 days after abortion.

Mycotic Abortion

This condition was first mentioned by Theobald Smith in 1920. In 1929 Bendixen and Plum in Denmark described 17 cases in detail and reproduced typical abortions in 5 to 6 pregnant cows by intravenous injection of spores of both *Aspergillus fumigatus* and *Absidia ramosa*. In this country Ainsworth and Austwick (1955) in the A.R.C. Survey of Animal Mycosis and Austwick and Venn (1957) have surveyed the position ; 280 mycotic abortions have so far been reported—*Aspergillus fumigatus* in 148 cases, Absidia in 41, and sporadic incidence of other species. We only reported 2 cases in 1956–7, but 8 have been found in the last 7 months. After Brucella, fungi are probably the next most important known cause of infectious abortion, at Weybridge 7·1 per cent. and at Bristol 6·4 per cent. of all foetuses examined have yielded fungi.

Characteristic Lesions

In the placenta intercaruncular areas show occasional small, raised yellowish leathery lesions. The cotyledons are solid, yellowish, "cushion-like" masses

with raised and thickened margins. There is failure of separation of the foetal cotyledon.

The foetal skin often shows small greyish raised soft discrete lesions. Smears from the foetal stomach will show the presence of fungal hyphae which can be grown in special media.

Epidemiology

Mycotic abortion is more prevalent in winter. The route and source are unknown but the condition is mainly associated with mouldy hay, probably originating as a pulmonary infection spreading to the blood stream. Venn (1958) has recently reproduced the condition by injecting heifers 4 months pregnant with Aspergillus spores.

Feeding experiments have failed to reproduce the condition. Rollinson in 1948 isolated Absidia from the prepuce of a bull which had served 2 cows which had aborted ; this, he suggested, was due to venereal transmission.

Other Infections Associated with Abortion

We have isolated a wide range of organisms from sporadic abortions, the commonest being *C. pyogenes*. But none of the organisms has been regularly isolated from a series of foetuses from a herd with an abortion problem, and none of them has been shown to fulfil Koch's postulates and so join the ranks of infectious abortion organisms.

Leptospira, particularly *L. pomona*, have been shown to be a serious cause of abortion in the U.S.A. but bacteriological and serological tests for them in this country have been negative.

Theoretically any organism involved in a bacteraemia or septicaemia could invade the placenta and cause abortion ; also, any toxaemia or prolonged acute pyrexia might be expected to kill the foetus and cause abortion or mummified foetus. We have had evidence which suggests that the high temperature associated with a tick-borne fever-like disease is associated with some cases of abortion.

Virus mucosal disease has been said to cause abortion by Fincher (1956) in the U.S.A., regardless of the severity of the illness, and pregnant cows may abort from 10 days to 3 months after infection. Foetuses in delayed abortion are not degenerated but are well preserved, although there are indications of arrested development at the time of the initial infection.

Non-Infectious Causes of Abortion

Vitamin A deficiency is said to cause abortion ; this has not been proved in cattle but a winter diet of straw and beet pulp could produce avitaminosis A. Maternal avitaminosis A in sows has been shown by Goodwin and Jennings (1958) to produce stillbirths, moribund litters and ophthalmic abnormalities. Experimental vitamin A deficiency in does has been shown by Lamming and Salisbury (1952) to produce foetal resorption which could be prevented by injecting progesterone.

Vitamin E deficiency in the rat causes resorption of embryos and abnormal foetuses. Vitamin E deficiency probably does not occur in adult cattle under normal conditions.

Iodine deficiency, a high herd incidence of aborted, stillborn and weakly calves, has been associated by Allcroft, Scarnell and Hignett (1954) with low plasma protein-bound iodine in the dam and enlarged hyperplastic foetal thyroids. This has been found also in sheep. The deficiency of iodine could be an actual one or it could be conditioned by a high Ca or protein intake or a goitrogen such as is sometimes found in kale and clover. We usually examine all foetal thyroids but have only found one marked abnormality, associated with abortion and premature birth in a group of heifers.

Oestrogens found in a species of clover in Australia have been associated with abortion in ewes. Oestrogens are also found in clovers in this country but have never been proved to cause trouble in cattle : the typical cystic endometrium found in ewes has not yet been found in cattle.

Stress

Hydrocortisone given to rats has increased the number of foetal resorptions, reduced placental and foetal size, and had a serious effect on foetal viability. Possibly the stress of heavy lactation, inadequate nutrition, change of environment, climate, etc., could affect cattle in a similar way, or possibly they could act by lowering natural or acquired immunity to infectious abortion.

Recently in the United States a new type of abortion has been described by Simon *et al.* (1958) in Wisconsin called the " Lowland Abortion Syndrome." They have described up to 400 abortions in unimproved lowland pastures in beef and dairy cattle in one county alone. No infection could be found. The incidence was highest in May, June and September. As it appeared to be associated with weeds, a controlled experiment was set up and half a pasture sprayed with hormone weed-killer. On the unsprayed pasture 10/12 pregnant heifers aborted but on the sprayed part only 1/8 aborted. No signs of impending abortions were observed. There was very little retention of membranes but foetuses appeared to have been dead some time and were found to have 100 ml.—1 litre of serosanguinous fluid in the pleural and peritoneal cavities. The heart showed degeneration of muscle, and petechial haemorrhages. The pleura of both lungs was thickened. There was degeneration and necrotic foci in the liver and necrosis of the spleen. Sanguinous fluid was present in the peri-renal fat. The medulla of the kidney was congested and necrosed. In 8 out of 10 cases the membranes were oedematous with characteristic intercotyledonary, circumscribed, necrotic calcified lesions. Many of the blood vessels were congested, thrombosed or thickened. Lesions in the dam were limited to the uterus and the lungs which showed characteristic pleural thickening and endarteritis of blood vessels. These changes could be attributed to anoxia. The flora of the pastures varied but a number of the weeds found had a high nitrate and nitrite content which the authors postulated was responsible, although methaemoglobin was not found in blood samples which were collected at weekly intervals.

Ergot

According to Menzies (1958) the most common result of ergot poisoning in cattle is gangrene. Abortion is less likely than stillbirth, and much less likely than lameness and enteritis.

Ergot contains a number of alkaloids with different actions, hence the symptoms depend on which of the toxins predominate.

Ergotoxin is believed to cause gangrene, ergometrine abortion and stillbirth while ergotamine gives rise to brain symptoms.

Fescue lameness has been described in Australia and is a pedal necrosis caused by an alkaloid resembling ergotoxin contained in the leaf of the tall fescue grass.

Glimpses into the Future

Now, it would be interesting to try to guess what lies under the remaining veils and to forecast what direction future research into the problem may take.

It might be profitable to spend some thought on the way in which these different factors may cause abortion and to do this the mechanism of normal parturition should be studied first. It is generally accepted that the steroid hormone, progesterone, is necessary for the maintenance of pregnancy. In the early stages this is supplied by the maternal corpus luteum but later on the placenta itself produces progesterone and other reproductive hormones. It has been proved that expression of the corpus luteum from mid-term onwards does not produce abortion, although it may be associated with retained membranes. Actually on more than one occasion I have expressed the corpus luteum associated with a 6-week pregnancy without terminating the pregnancy. From this it would appear that the foetus itself, through its placenta, controls the pregnancy possibly from as early as 6 weeks onwards.

It has recently been shown by Short (1958) that the blood level of progesterone in the pregnant cow rises from conception to the 32nd day and then remains constant at a high level until the 256th day and subsequently drops rapidly to a low level on the day preceding calving. This drop in progesterone probably removes the inhibition on the large amount of oestrogen which circulates in most pregnant mammals and this oestrogen in turn sensitises the uterine muscles to the action of oxytocin. This is only speculation at the moment and much more work is necessary on the dynamics of the steroid hormones in pregnancy. The blood level may not give us a true picture of the amount produced as progesterone only survives for a short period in blood and the target organs probably absorb a considerable proportion. The adrenal cortex of the pregnant cow also contributes progesterone to the circulation. An interesting point for speculation is how does infection cause abortion? It is generally agreed that in most infectious abortions a placentitis precedes the abortion and the organism responsible is found in the foetus in some infections but not in others. Is the abortion caused by an interference with the progesterone output by the placenta, or does it follow death of the foetus caused by anoxia or by toxins from the infected placenta? A deeper knowledge of this mechanism might explain the phenomena of mummified foetus and live premature birth.

There have been some suggestions that an unidentified virus may be responsible for some of the abortion outbreaks hitherto unexplained. We have noted lesions in the placenta of some of the bacteriologically negative cases which suggest an infection.

Finally, there is a possibility of an iso-immunisation factor similar to the human "rhesus factor." Laing and Blakemore (1951) observed abortion in the cow following immunisation with incompatible whole blood. There is also an abortion problem connected with ovum transfer in cattle.

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FAO AND OIE ANIMAL HEALTH YEAR BOOK FOR 1958

The first issue of an Animal Health Year Book, containing information from more than 100 countries and territories on animal disease and disease-control measures, has been issued by the Food and Agriculture Organisation. The Year Book, prepared jointly by FAO and the Office International des Epizooties (OIE), was drawn up on the basis of a questionnaire which was sent to FAO and OIE member governments asking particulars of the occurrence of diseases in an established list, their duration in the country, and their intensity. The diseases covered include those of economic importance as well as those which are infectious.

It is planned to issue the book annually. The report should be of particular use to veterinary authorities when imports of animals or animal products are being considered, or where traffic of animals into or through a country takes place.

The Survival of *Leptospira canicola* in the Renal Tissue of a Pig

BY

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SUMMARY.—For 7 days post mortem, *motile* Leptospira canicola *were demonstrated in films of fluid obtained after maceration of naturally infected pig kidneys that had been stored at 0° to 4° C., but on the 8th and 9th days only non-motile forms of the organism were distinguishable. When macerated material was subsequently kept at room temperature, Leptospirae were numerous and actively motile for another 1 to 3 days. Motility was inhibited when the* pH *of the tissue approximated 5·9 and organisms disappeared within 24 to 48 hours in fluid of* pH *= 5·8, or lower. On the 2nd and the 5th day of storage at 0° to 4° C., the reaction of renal tissue was found to be* pH *= 6,735 and from such material Leptospirae were recovered for up to 12 days after death.*

Introduction

EVIDENCE of the survival of *Leptospira canicola* outside the animal body may be deduced from reports of epidemics of human canicola fever. Thus, some have occurred as a result of bathing in fresh waters contaminated by cattle and pig urine containing Leptospira (Williams, 1953). Piggery workers have contracted the disease through urine of carrier pigs (Seiler *et al.* 1956 ; Van der Hoeden, 1956). Children developed canicola fever after swimming in a muddy pool contaminated by dogs, the sera of which contained *L. canicola* antibodies (Campbell *et al.*, 1950). Field workers, employed in rice fields in particular, are also exposed to infection by the same serotype (Berengo & Bussinella, 1952 ; Misao *et al.*, 1954). It appears, therefore, that *L. canicola* can survive in the voided urine of carrier animals, in waters contaminated by such urines and in wet soil, but the period of its survival in any of those situations still remains undetermined.

The incidence of *L. canicola* infection among pigs in this country appears to be much higher than has been hitherto realised and the possibility of human, and other animal infection, through the medium of raw pork, or of pig kidneys, in particular, has already been suggested (Michna, 1959). For those reasons the present investigation was undertaken to determine the survival of this organism in naturally infected pig renal tissue stored at a temperature of 0° to 4° C.

Materials and Methods

Within 1 hour after death the kidneys were removed from a stunted pig that had been obtained from a commercial piggery, where the existence of infection by *L. canicola* had been established by recovery of the organism as well as by the serological means. The animal was one of a group of 13 of which all the other members were in good shape and almost ready to be slaughtered for human consumption. Autopsy revealed diaphragmatic hernia with a length of about 1 ft. of the small intestine thrust into the thoracic cavity and associated with fibrinous inflammation of the adjacent peritoneum. Fibrino-haemorrhagic colitis was also present. The cortex and the medulla of both kidneys contained numerous yellowish foci which were mainly pin-point in size although a few were slightly larger.

By means of the Schuffner agglutination-lysis test, performed by the technique recommended by Wolff (1954), the serum of the creature was found to contain antibodies only to *L. canicola* and *L. icterohaemorrhagiae* to dilutions of 1:30,000 and 1:1,000 respectively.

Evidence of the survival of *L. canicola* was sought by the 2 following procedures :

A. *Microscopical :* by means of dark-ground microscopy and a 2 mm. objective. Motility was taken as the first indication of viability.

B. *Cultural :* the organism was grown in Schuffner's medium, as modified by Stuart (1946). The medium was dispensed in 3·5 ml. amounts in screw-capped bottles of bijou 5 ml. size. Ten to 12 bijou bottles were inoculated daily with renal tissue extracted through the seared renal capsule by means of a sterile Pasteur pipette. The cultures were incubated aerobically at 32° C. They were examined at weekly intervals for a period of 5 weeks by means of a 16 mm. objective and a x20 ocular. From 1 half of 1 kidney the capsule was stripped for gross pathological examination and parts were excised for histopathological study. From the same half, too, portions of approximately 2 g. weight were removed daily for purposes of dark-ground microscopy. Cultures were made from the unstripped half of the organ and also from the other kidney. Throughout the period of investigation the kidney material was kept in a sterile glass container and stored in the refrigerator. Day by day, the portions of renal tissue were ground in a mortar with sterile silver sand and the resultant material was suspended in sterile normal saline solution. After centrifugation at 1,000 r.p.m. for 3 minutes, a wet film was made from the supernatant fluid and examined by dark-ground microscopy. Similar examination was made daily for the next 6 days during which the supernatant was kept on the bench at room temperature. In two instances the reaction of newly macerated renal tissue was estimated in the Department of Veterinary Physiology by means of an E.I.L. Vibron electrometer. In all other cases *p*H values were obtained by means of a B.D.H. capillator.

Results of Examination

Table I shows that motile Leptospirae were demonstrable for 7 days in kidney tissue that was stored at the refrigerator temperature. Non-motile forms

TABLE I

MICROSCOPICAL EXAMINATION OF MACERATED PIG KIDNEYS

Macerated	Examined											
	25/6	26/6	27/6	28/6	29/6	30/6	1/7	2/7	3/7	4/7	5/7	6/7
25/6	+	+	+	+	c. n.m.	–	–					
26/6		+	+	+	c. n.m.	–	–					
27/6			+	+	+	c. n.m.	–	–				
28/6				+	+	+	c. n.m.	–	–			
29/6					+	c. n.m.	–	–				
30/6						+	+	+	c. –	–		
1/7							+	+	c. –	–		
2/7								+	c. –	–		
3/7									n.m.	–	–	
4/7										n.m.	–	–
5/7											–	–

+ = motile Leptospira. c. = contaminated.
n.m. = non-motile Leptospira. – = negative.

were observed for a further 2 days. In a saline suspension of kidney tissue maintained at ordinary room temperature motile Leptospirae were found for 1 to 3 days.

It was noted, too, that the onset of bacterial contamination was associated with fairly rapid loss of motility and ultimate disappearance of Leptospira. Those changes coincided with an increase of acidity of the medium to *p*H = 5·9 or more, as shown in Table II.

The critical figure for the survival and motility of Leptospira appears to be about *p*H = 6.0, below which the organisms lose motility, clump together and ultimately disappear within 24 to 48 hours.

The results of cultural examination are shown in Table III.

Leptospirae were recovered from chilled pig renal tissue for up to 12 days after slaughter. In Table III, the numerator indicates the number of cultures in which growth of Leptospira occurred whereas the denominator denotes the total number of cultures made on a given day. Thus, 11 out of the 12 bottles inoculated on the day of animal's death culture proved positive, and growth was observed in some cultures as early as the 5th day of incubation. Whenever bacterial contamination occurred, however, culture of Leptospira proved negative. The vitality of Leptospira in pig renal tissue was visibly diminishing by the 11th to the 12th day after slaughter when only

TABLE II

THE *p*H VALUES AND THE EFFECT ON LEPTOSPIRA

Macerated	*p*H estimated	*p*H found	Microscopical
25/6	29/6	5·9	Non-motile Contaminated
26/6	30/6	5·8	Negative Contaminated
27/6	27/6	6·735	Many motile Leptospirae
27/6	30/6	5·9	Non-motile Contaminated
28/6	30/6	6·1	Motile Leptospirae
29/6	30/6	5·9	Non-motile Contaminated
30/6	30/6	6·735	Many motile Leptospirae

2 and 1 out of 10 bottles respectively contained satisfactory growth, yet the residual cultures remained free from bacterial contamination. As all culture media inoculated on the 13th day of storage proved negative for Leptospira after 5 weeks of incubation, it was assumed the organism did not survive in pig

TABLE III

CULTIVATION OF *L. canicola* FROM PIG KIDNEYS CHILLED AT THE REFRIGERATOR TEMPERATURE

Media inoculated													
25/6	26/6	27/6	28/6	29/6	30/6	1/7	2/7	3/7	4/7	5/7	6/7	7/7	8/7
11/12*	5/10	6/10	5/10	10/12	12/12	7/10	7/10	9/10	6/10	—	2/10	1/10	—

*Growth in : 11 bottles out of 12 inoculated

renal tissue for that length of time. The evidence that the cultivated organism was *L. canicola* was obtained by means of the agglutination-lysis test, the results of which are presented in Table IV.

Strain 35667 reacted positively with rabbit stock *L. canicola* antiserum to a dilution 1:10,000 and gave a cross reaction of 1:100 against *L. icterohaemorrhagiae* ; with pig 35667 serum it reacted to a titre of 1:30,000. There was no reaction with *L. grippotyphosa*, *L. hyos* and *L. pomona* rabbit antisera.

The isolated culture proved pathogenic to a 10-week-old golden hamster (*Mesocricetus auratus*), which animal died 12 days after intraperitoneal inoculation of 1 ml. of a third generation subculture. A guinea-pig survived a dose of 2 ml. given intraperitoneally although it manifested a thermal reaction followed by the appearance of *L. canicola* antibodies in a dilution 1:100.

Discussion

A fair amount of information regarding either the survival or the infectivity of other leptospiral serotypes can be obtained from a review of the literature. The survival of *L. icterohaemorrhagiae* in such divers conditions as distilled water (Noguchi, 1918b), urine (Davidson & Smith, 1936), fresh waters, (Van Thiel, 1937), sea water (Chang *et al.* 1948), sewage (Alston, 1948), and milk (Kirschner & Maguire, 1955) has been reported. Mantovani (1950b) studied the survival of that organism in artificially infected pieces of bovine diaphragm. Outbreaks of leptospirosis among human beings due to the consumption of *L. grippotyphosa* in milk from ailing or recovered cows were reported by Alisowa (1946) and by Laskin (1950). *L. bovis* (= *grippotyphosa*) has been found to survive in the bovine carcase for 33 hours after slaughter and to remain alive in milk for 3 days (Bernkopf *et. al.* 1948). An outbreak of leptospirosis in silver foxes was caused by feeding infected meat (Lubaszenko, 1948). Puppies and cats developed leptospirosis after they were fed with veal from artificially infected calves (Cyss, 1955). *L. pomona* survived overnight in jaundiced pig kidneys chilled at a temperature of 5° C., and was subsequently recovered through a guinea-pig inoculated with the supernatant fluid of the macerated organ (Sippel, 1952). Shitow (1955), studied the survival of Leptospira in meat and milk and used sousliks as experimental animals. Extensive investigations regarding the infectivity of meat from sousliks, lambs and rabbits artificially infected with Leptospira serotype 2 (*L. pomona*) were carried out by Kotowa (1955).

The result of the present investigation differs from those cited in the available literature. It has been shown that in fluid, obtained by maceration of naturally infected renal tissue stored in the refrigerator, motile Leptospirae were demonstrable for 7 days after slaughter and that non-motile forms were distinguishable for another 2 days. When the macerated material was subsequently kept at room temperature, numerous and actively motile organisms were detectable up to 3 days. On the other hand, when the reaction of the macerated material approximated *p*H = 5·9 in consequence of bacterial contamination, motility was inhibited and leptospirae disappeared altogether within 24 to 48 hours in fluids of *p*H = 5·8 or below. On the 2nd and 5th day of storage at 0° to 4° C. the reaction of renal tissue, when free from bacterial contamination, was found to be *p*H = 6·735 and from such material *L. canicola* was cultivable for up to 12 days after death. This finding supports the previously expressed view that an infected pig is not only a daily risk to its attendants but, after slaughter, it may also endanger abattoir workers, butchers and housewives. Rosenberg (1951) stated that in only two-thirds of 131 cases of human canicola fever was there a history of close canine contact although 75 per cent. of the dogs involved were infected by *L. canicola* ; the dog could not be incriminated in the remaining cases. The original belief, which prevailed for many years that the dog was the sole source of human canicola fever (Dhont *et al.*, 1934) has been modified recently by Alston & Broom (1958). It may be, therefore, that kidneys of carrier pigs are the source of those, so far, epidemiologically mysterious cases of human canicola fever and, possibly if given in raw state, may be responsible for leptospirosis in dogs and cats.

TABLE IV

AGGLUTINATION-LYSIS TEST ON *L. Canicola* STRAIN 35667.

Antigen 35667	Rabbit antisera					Pig 35667
	L. canicola	*L. icterohaemorr.*	*L. grippotyphosa*	*L. hyos.*	*L. pomona.*	Serum.
	1/10,000	1/100	—	—	—	1:30,000

Since the completion of these studies 2 more examinations have been carried out on the survival of *L. canicola*. One concerned the kidneys of a dog in which antibodies to *L. canicola* and *L. icterohaemorrhagiae* had been found to dilutions of 1:100,000 and 1:1,000 respectively. By means of dark ground microscopy motile Leptospirae were seen in fluid from macerated kidneys for 7 days and non-motile forms for another 3 days. From those kidneys the organism was cultivated for up to 9 days. In the second examination 2 fresh pig kidneys taken from an animal without specific antibodies in its serum were employed. Each kidney was injected with 1·5 ml. of an actively growing culture of *L. canicola*, Utrecht stain, and placed in the refrigerator. The organism was recovered from those kidneys for up to 21 days of storage.

Personal observations indicate that in undiluted naturally infected dog urine, kept at room temperature, *L. canicola* is microscopically demonstrable for up to 7 days. When the acidity of the urine reached *p*H = 5·6 or there was an increase of alkalinity to *p*H = 7·8 or more the Leptospirae lost their motility and quickly disappeared.

Conclusions

It is apparent from the foregoing studies that *L. canicola* can survive for 12 days in naturally infected pig kidneys kept at refrigerator temperature. This finding supports the previously expressed view that an infected pig represents a public health problem. Kidneys of carrier animals, if given in a raw state, may be responsible for leptospirosis in dogs and cats.

Acknowledgments.—My thanks are due to Professor J. W. Emslie for his advice and help in the preparation of this paper, to Dr. J. C. Broom for carrying out the absorption test and to the Department of Veterinary Physiology for the *p*H testing. I wish to acknowledge the valuable technical assistance received from Miss Doreen Cowan.

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SOCIETY FOR APPLIED BACTERIOLOGY

At the Annual Meeting of the Society for Applied Bacteriology, held in London on July 8th, the following were confirmed in office: Hon. President, Mr. D. A. McKenzie; Hon. Treasurer, Mr. G. Elis Jones; Hon. Editors, Dr. S. E. Jacobs and Dr. C. A. E. Briggs; Hon. Publications Manager, Mr. A. H. Walters; Hon. Advertising Manager, Mr. E. J. Mann; Members of Committee, Dr. Eve Billing, Mr. N. J. Butler, Professor E. L. Crossley, Dr. J. G. Davis, Mr. B. M. Gibbs, Mr. D. J. Jayne-Williams, Dr. Jane Meiklejohn, Dr. G. C. Ware, and Dr. M. Woodbine.

After 8 years as Hon. Secretary of the Society, Mr. G. Sykes announced his resignation. His place will be taken by Dr. Ella M. Barnes, D.PHIL., DIP.BACT., Low Temperature Research Station, Downing Street, Cambridge. This change will take place towards the end of October.

ALUMNUS ASSOCIATION MEETINGS AT FOLKESTONE

The annual general meeting and dinner of the Royal (Dick) School of Veterinary Studies Alumnus Association will be held in The Metropole Hotel, Folkestone, on Tuesday, September 1st, 1959, at 6.30 p.m. for 7 p.m. Those wishing to attend should notify Mr. A. Spreull by midday Monday, August 31st.

It is intended to hold the Annual General Meeting and Dinner of the Glasgow Veterinary School Alumnus Association at the Grand Hotel, Folkestone, on Thursday, September 3rd, 7.30 p.m. for 8 p.m. Members should notify Mr. R. N. C. Aitken of their intention to attend.

Current Literature

BOOK REVIEWS

Reproduction in Domestic Animals. Vol. 1. Edited by H. H. COLE & P. T. CUPPS (1959). Academic Press Inc., New York & London. 116s.

This book, which is the first of two volumes, contains contributions by 18 authors, each an expert in his own field, and is aimed at the more advanced student and research worker. Two chapters are devoted to the anatomy of the reproductive organs, and are extremely valuable as the paucity of information on this subject in standard anatomy books on domestic animals is notorious. The book deals with the up-to-date knowledge of the action of the hormones of the pituitary, gonads, thyroid and adrenal in their general application to animals, and is followed by a detailed analysis of the oestrous cycle in each of the domestic species. The pattern of normal reproduction is followed in later chapters which deal with fertilisation, implantation, endocrine mechanisms in pregnancy, gestation, and finally mammary growth and lactation.

Altogether it forms a completely up-to-date and very comprehensive volume of a high standard with expert appraisal of recent publications. The book will appeal immensely to the graduate and advanced student. It is also an invaluable reference book for the veterinary surgeon in practice, and the section dealing specifically with the domestic animals are of very direct interest.

Practical Animal Husbandry. By W. C. MILLER and E. D. S. ROBERTSON. 7th edition (revised and enlarged). 650 pp. with numerous illustrations. 1959. Oliver & Boyd, Edinburgh. 31s. 6d.

The latest edition of this well-known work follows the general pattern of its predecessors, but has been enlarged to contain new material. The horse still retains pride of place, but with each edition the sections dealing with the other categories of farm livestock become of greater value. It would seem that, in time, either this work must attain very considerable proportions or that it will have to appear in more than one volume. As it is, much of the information on certain species, although useful, is insufficiently comprehensive.

Some of the new material is, unfortunately, a little disappointing. Thus, in the section on fur farming, several pages are devoted to foxes, the commercial production of which is negligible in the U.K. at the present time, whereas little more than a single page is devoted to the currently far more important mink. On the other hand, the artificial feeding of baby pigs is much more satisfactorily dealt with.

There is, of course, every reason to integrate feeding with management, but in a work of this kind it is possible to devote relatively little space to systems of feeding, and one wonders whether it might not be better to omit nutritional considerations as such but merely to provide suitable cross-references to relevant works and to utilise the pages saved for other important husbandry considerations.

Despite these adverse criticisms, the work remains of tremendous value to veterinary students and others, and it is to be hoped that the new—and future—editions will receive the success deserved.

Son of the Soil. By GEORGE GALL RENNIE. University Press, Aberdeen. 14s. 6d.

Mr. G. G. Rennie is a veterinary surgeon, and a Divisional Veterinary Officer of the Animal Health Division, Ministry of Agriculture. This is his autobiography. Mr. Rennie relates in lucid English, incidents from his life as a farmer, soldier, and veterinarian. The book reflects the author's lively interest in his fellow men, and it is the farmer, rather than his animals, which form the main theme. Much of the 165 pages are concerned with Argyll and its islands for which Mr. Rennie obviously has a deep affection, and a detailed knowledge of their history.

It is somewhat unusual these days to read an autobiography in which we are not startled by high adventure in some tropic clime, or demented by the drama in enemy-occupied territory. "Son of the Soil" is a wholesome, pleasing book in which to browse at bedtime—and dream, perchance, of Highland scenic grandeur, duck shooting or sheep scab.

British Small Animal Veterinary Association First Annual Congress 1958. 136 pp. 67 illustrations. Distributed by H. K. Lewis & Co. Ltd., London. £2 2s.

This first Congress Report of the B.S.A.V.A., undoubtedly provides an occasion for congratulation to the Association which is now a non-territorial Division of the B.V.A.

As the title indicates it is a factual report of papers, discussions and films, presented at what was clearly a very successful first annual congress. The volume is in paper covers, and in the quality of production it compares with most good professional quarterly journals.

The programme here reported is a well balanced one covering a wide variety of aspects of small-animal practice and the standard of the papers and discussions which are quoted in full is generally high.

The first paper is an account by a veterinary surgeon in practice of the use of intravenous solutions, including blood, therapeutically in the dog and the second, which is linked with it, is on the management of shock. The discussion on these two is taken together and the whole forms a valuable item for reference.

There follows a general discussion on current research in small-animal diseases, the deficiencies, and how these may be overcome. As always in any such discussion there appears to be a considerable gulf between the desirable and the financially possible. Two main points emerge. Firstly, the enormous need for research into the commonplace such as skin diseases, etc., and secondly, the welcome advent of such specialists in the veterinary schools as for example the veterinary neurologist.

(*Continued at foot of page* 557)

The Victoria Veterinary Benevolent Fund

A general meeting of the members of the Association was held at 10, Red Lion Square, London, W.C.1, on Wednesday, June 3rd, 1959, at 1.30 p.m.

The President, Mr. H. W. Dawes, C.B.E., F.R.C.V.S., was in the Chair.

There were also present: Mr. G. Atkinson, Professor G. F. Boddie, Major J. J. Dunlop, Messrs. R. C. U. Fisher, J. A. Flynn, Mrs. Daisy I. Glover, Dr. R. E. Glover, Mr. G. N. Gould, Miss J. O. Joshua, Professors H. G. Lamont, R. Lovell, J. McCunn, A. Messervy, Captain T. M. Mitchell, Professor L. P. Pugh, Messrs. J. N. Ritchie, H. Sumner, Miss V. Tillemont-Thomason, Mrs. Erica I. Thomson, Professors W. L. Weipers, E. G. White, and Mr. H. M. Wilson.

Notice Convening the Meeting

The Secretary (Mr. C. W. Francis) read the Notice convening the Meeting.

Minutes

It was agreed that the Minutes of the previous meeting, which had been printed in THE VETERINARY RECORD, be signed as a correct record.

Apologies for Absence

The Secretary: "Apologies for their absence have been received from Professor T. J. Bosworth, Mr. E. Clark, Captain A. Whicher, and Major W. H. Wortley."

Election of President

On the motion of Major J. J. Dunlop, seconded by Mr. G. N. Gould, Mr. H. W. Dawes was unanimously re-elected President.

Election of Four Vice-Presidents

The President: "The next item is the election of 4 Vice-Presidents. The Vice-Presidents are Captain T. M. Mitchell, Professor L. P. Pugh, Mr. Henry Sumner, and Mr. J. N. Ritchie."

The re-election of the 4 Vice-Presidents was proposed.

Captain T. M. Mitchell: "Before the motion is put to the meeting, may I make a plea that the meeting accepts my resignation as Vice-President. Some years ago I was made a Councillor of this body, and I have just discovered that somehow I am a Vice-President. I live in the north of England. I never attend a meeting of the Council unless it is held during the time when I am in London for Council meetings of the R.C.V.S. I feel that I am somewhat of an encumbrance or a little dead wood which should be cut out from this body. I therefore enter a plea that my name be left out of these nominations. Someone else could be elected to the Council who can give better service, perhaps, than I can give."

The President: "I am sure that everyone present heard Captain Mitchell's remarks with very mixed feelings. I know that your opinion of Captain Mitchell is the same as mine, and that you do not want to accept that resignation. Captain Mitchell is one of the senior members of the Council of the Royal College. He has been on the Council of the Benevolent Fund for a number of years. He represents a part of the world from which you require representation. Even though Captain Mitchell is not always able to attend in person, we have only to write to him at any time in order to get everything done that we could possibly hope for from the point of view of enquiry, or in any other manner in which he can help the Fund. I feel that I am interpreting the wishes of the meeting when I say that it is not the wish of the Members that your resignation should be accepted, Captain Mitchell."

Mr. G. N. Gould: "I should like to propose that Captain Mitchell be asked to continue being a missionary in the north of England."

The motion for the re-election of the 4 Vice-Presidents was put to the meeting and carried unanimously.

Election of Honorary Secretary

The President: "I move the re-election of Major J. J. Dunlop as Honorary Secretary. As a member of the Executive Committee, I know the work performed by the executive officers."

Mr. J. N. Ritchie: "I second Major Dunlop's re-election."

The motion was carried unanimously.

Election of Honorary Treasurer

The re-election of Professor J. McCunn as Honorary Treasurer having been proposed by Mr. G. N. Gould and seconded by Professor L. P. Pugh, the motion was put to the meeting and carried unanimously.

The President: "I can say without any fear of contradiction that Professor McCunn looks after our finances very well, and they are in a reasonably stable position at the moment."

Re-appointment of Auditors

On the motion of Captain Mitchell, seconded by Mrs. E. I. Thomson, Messrs. Wilkinson, Chater & Co. were re-appointed auditors.

Annual Report and Statement of Accounts

The President: "It is the usual custom to take the Annual Report and Statement of Accounts page by page and I think that that would be the best way to deal with them. The Report commences on page 5. Page 6 continues with the report of the last Annual General Meeting. The report on the year's work commences at the bottom of page 6. You will notice that there was an increase in the amount of relief granted, it being nearly £450 more than in the previous year. There were 6 new cases and 4 cases were discontinued. The total number of cases assisted was 57, as against 47 in 1957.

"I must draw the attention of members to the contribution received from the Ladies' Guild, which is set out on page 7. It is a very large contribution, and it is really remarkable how the contributions from the Ladies' Guild continue year by year. I should like from the Chair to express the very grateful thanks of the meeting as a whole to the Ladies' Guild for their good work.

"The next part of page 7 deals with legacies and donations. I wish to draw attention to the excellent financial support sent by the Veterinary Medical

Association of Ireland. The excellent support for the good work of this Fund which we receive from Ireland is a matter of pleasure, not only to myself as President, but also to the Officers and every member. We have been able to help our unfortunate confrères in Ireland, and the fact that they are assisting us by contributing so well means a great deal to the Fund as a whole. As you know, for many years it seemed that it was difficult to convey to our Irish colleagues the existence of this Fund and the work it did. I should like from the Chair to pay a tribute to Mr. Flynn and the other members of this body who hail from Ireland for the excellent way in which they have put the work of the Benevolent Fund across to their professional colleagues. I hope that when they leave this meeting and return to their native countries they will noise abroad to their colleagues how very much we at this Annual General Meeting have appreciated the help that they give us."

Mr. J. A. Flynn: "Thank you. I will convey your remarks to my colleagues in Ireland. We hope to be able to continue with our contributions to the Fund in the future. We greatly appreciate what this Fund has done for recipients in Ireland in the past. At one time we were not contributing very much to this Fund, but now we are doing our best and we should be able to increase it."

The President: "I hope that we shall gradually increase our number of subscribers. As we find that the actual number of them is still very limited. It is rather surprising to me that so many younger veterinary surgeons forget that a small contribution of half a guinea or a guinea to this Benevolent Fund is not only an expression of good will, but is almost a small life assurance. Many of these younger members perhaps never think of what might lie round the corner and how soon, owing to death or accident, it might be necessary for their dependents to apply to us for help. I make the point because I feel that, after this annual subscription to the Royal College, the two most important funds to which a young veterinary surgeon should contribute are, first the Defence Fund and, secondly, this Benevolent Fund. It should be brought home to the younger member on every possible occasion that that should be almost his first commitment once he is registered by the Royal College of Veterinary Surgeons.

"On page 9 there is an account of the state of the Frederick C. Hunting Trust. There is also an account, fairly up to date, of the proceedings which have taken place under the Wortley Axe Bequest. The Council concerned with the Wortley Axe Bequest may seem to move somewhat slowly. It may seem also that the Council of this Benevolent Fund is somewhat slow in implementing the conditions of the Wortley Axe Bequest. I can assure you that at present we have covered a great deal of ground and I hope that we shall be in a position within the next few months to commence the implementation of some form of building of bungalows for our more unfortunate dependents. Having broken the ice with the Charity Commissioners and having established ourselves on a friendly footing, I think that we are doing very well. With the assistance of one or two members, not only of the Wortley Axe Committee, but also of the Council of this Fund, I hope that we shall be in a position before the end of the year to say that we are beginning to build.

"Pages 10 and 11 contain the report of the Ladies' Guild. From the Chair I should like to say how much I personally, in common with all members of the Council of this Fund, appreciate the work of Mrs. Glover. No one that I know of connected with this Fund works harder and more enthusiastically to keep it in front than Mrs. Glover. I hope that Mrs. Glover will accept from me, on behalf of all members, our thanks and appreciation for the good work she does.

"Page 11 contains details of amounts received by the Ladies' Guild. I wish to draw the attention of members present to the good work done in Scotland by four ladies who have been very successfully promoting dances in aid of the Ladies' Guild. You will notice that 5 dances have been promoted, all of which have resulted in considerable financial aid to the Fund.

"Pages 12 to 16 contain a list of recipients who we are helping at present. This list makes somewhat sad, but at the same time very interesting, reading. Members of the Fund will be surprised at the number of people we have to help who are not necessarily very old. This bears out my earlier statement that one never knows, particularly in a hazardous occupation such as veterinary surgery, when help will be required from the Fund. A total of £3,270 1s. 5d. has been expended by the Fund during the year.

"Page 17 lists the schedule of general fund investments as at December 31st, 1958. If anyone has any questions to raise, will he do so as we go along?

"Pages 18 and 19 contain the Balance Sheet. I think you will agree from a study of that that we are at any rate in a reasonably satisfactory position.

"Pages 20 and 21 contain the income and expenditure account.

"Although perhaps I should not say this from the Chair, our administrative expenses are extremely low compared to the amount of relief we administer. That is just as it should be in a charitable institution such as this.

"Pages 22 and 23 contain the income and expenditure account and the balance sheet of the Frederick C. Hunting Trust. The Frederick C. Hunting Trust is able to render a great deal of support to the Victoria Veterinary Benevolent Fund.

"The remaining pages contain forms for forwarding subscriptions and a notice in regard to bequests.

"The Report is now open for discussion. My colleagues and I will do our best to answer any questions."

Professor W. L. Weipers: "I notice from the Schedule of General Fund Investments that the holdings seem to be all in trustee stock. The Frederick C. Hunting Trust appears to have preference shares in one or two companies. Is there any reason why we cannot invest some of the General Fund in something a little more profitable than the shares we have at present, in view of the way these have failed to appreciate in the recent past as compared with equities, or do we need permission from the Charity Commissioners?"

The President: "As we are a charity we have to move rather carefully with regard to investments."

Mr. G. N. Gould: "I think that there has been a change in the law relating to that, and it might be well worth while looking into this question. I think that one-third of a fund can be invested in equity, if it is wished. It would be possible to change some of these investments with advantage. I will not go into it further. Mr. Francis will know much more about it than most people."

The President: "Thank you very much for that point, Mr. Gould. The Frederick C. Hunting Trust is on a rather different footing and is entirely independent of the Victoria Veterinary Benevolent Fund. I am sure that the Honorary Treasurer will be only too pleased to look into that point."

Mr. Gould: "Professor Weipers was probably drawing attention to the depreciation shown in the balance sheet. The investments cost £51,579, but their market value in 1957 was £34,487 and they have appreciated by just about £3,000 in the last twelve months. It might be an advantage if some of the investments were sold and others acquired."

The President: "We will look into that."

Professor J. McCunn: "It could work the other way. We might put money in an investment company and wake up the next day and have nothing much there."

Professor Weipers: "I do not wish to press this. I shall be happy if the Treasurer looks into it. I notice from page 9 that the cash payment from the Northern Petroleum Tank Steamship Co. was invested in Funding Stock. We could probably have invested this in something more profitable."

Mr. Gould: "The Frederick C. Hunting Trust has 3 trustees and is distinct from the Victoria Veterinary Benevolent Fund. It is an excellent Trust. I think you will find that that investment is in a dated stock and there is unlikely to be any capital loss eventually. It is bought at a price which provides a good return for the money, and it is a trustee stock approved by the Charity Commissioners.

Mr. Gould moved, and Mr. Flynn seconded, that the Annual Report for 1958 be adopted.

The motion was put to the meeting and carried.

Election of Ten Members of the Association to Serve on the Council

The President: "The names of the present Members are set out on page 3: Mrs. D. I. Glover, Dr. W. R. Wooldridge, Mr. G. N. Gould, Professor R. Lovell, Captain A. Whicher, Mr. E. P. Barrett, Professor W. L. Weipers, Mr. A. Spicer, Professor C. Formston, and Mr. J. A. Flynn."

Mr. J. N. Ritchie: "I move that those ten Members be re-elected *en bloc*."

Mrs. D. I. Glover: "If I am re-elected to-day I shall be very happy to serve, and I wish to thank everyone present for honouring me in that way. However, I wonder whether it would be better if in future I represented the Ladies' Guild. Then when I retire from the Ladies' Guild it will give them a chance to replace me, so that they will always have someone representing them. Otherwise it will be the President of the Ladies' Guild, but she is with you for a year only and there is no continuity. In order that continuity should be preserved it would be far better that I should represent the Ladies' Guild rather than the Members of the Fund. I feel that the Ladies' Guild representation is very small and a little uncertain."

The President: "I would prefer to deal with that through Council. I should like you to allow your name to stand, Mrs. Glover."

Mrs. Glover: "Very well."

The President: "Otherwise it would mean establishing a precedent. If we are to give additional representation to the Ladies' Guild it will have to go to the Council in the proper way. It will be brought up at the next meeting of the Council."

Mrs. Glover: "I hope that the Council will consider it. The Ladies' Guild feel a little strongly about it."

The President: "We will look into it. In the meantime, I want you to allow your name to remain as representing the Members of the Fund."

The motion, having been duly seconded, was put to the meeting, and carried.

Other General Business

Mr. R. C. U. Fisher: "It has occurred to me, after hearing Mr. Gould speak about the Frederick C. Hunting Trust, that there is no indication in the Report as to who are the trustees. For the information of the general public would it not be a good idea if the names of the trustees of the Frederick C. Hunting Trust were incorporated in the report?"

The President: "There will be no difficulty about that. The names of the Trustees can be incorporated in the Report."

Mr. Gould: "The Frederick C. Hunting Trust is quite different from the Victoria Veterinary Benevolent Fund."

Mr. R. C. U. Fisher: "As the figures are incorporated in the Report, I thought that it would be of interest to members if the names of the trustees were included."

The President: "That will be done."

Dr. R. E. Glover: "I should like to move a very warm vote of thanks to the President and to the Officers for the services they have rendered to the Fund. I feel that the profession knows all too little about the work performed by the Officers and the Council behind the scenes. We should make it publicly known that the members of the Fund appreciate what they do. The profession itself ought to know.

"I wish to refer in particular to the work done in regard to the Wortley Axe Bequest. One knows how much detailed consideration has to be given to the selection of sites, negotiations with the Charity Commissioners, and so on. We deeply appreciate the work which has been done in that regard by the President and the Council."

The motion, seconded by Professor Weipers, was put to the meeting and carried unanimously.

The President: "On behalf of the Officers and the Council may I say how very grateful we are for those kind remarks. We deeply appreciate the way in which the Members of the Fund have carried the motion."

The meeting then terminated.

News and Comment

CAMBRIDGE VETERINARY INVESTIGATION CENTRE

During the first two weeks in September the Cambridge Veterinary Investigation Centre will be moving to new premises and the address will then be:—

Ministry of Agriculture,
Veterinary Investigation Centre,
Madingley Road,
Cambridge.

The telephone number will remain Cambridge 58691.

During the period August 31st to September 11th, specimens and requests for help throughout East Anglia should be addressed to:—

Ministry of Agriculture,
Veterinary Investigation Centre,
Mile Cross Lane,
Norwich.

Telephone Number: Norwich 45395.

MR. HARRY DAVIS SPARROW

Professor McCunn writes:—

Harry Sparrow died at his home at Rochford, Essex, on July 2nd, 1959. He was 69 years of age and he graduated M.R.C.V.S. from the Royal Veterinary College on June 21st, 1911. Although his illness was one from which there was little hope of recovery he was not laid by for very long. In April, when my wife and I had the pleasure of spending a Sunday with him and Mrs. Sparrow at their home, he seemed to be in pretty good order and as usual he showed great interest in his work and in the people and things of his natal countryside which he loved so much. Harry Sparrow was a big and strong man in the physical sense but he was also big in heart and in his outlook on life. He was an acute observer and he took a keen interest in the natural history of the countryside. He was an acknowledged expert on the local flora and that of Essex also. He discovered several plants which had not been recorded previously as being present in the county. He was well versed in archaeology, particularly that of Essex, and, if you rode with him on his rounds, he seemed to know the story of every building and ruin that one passed.

His main interest in life was in his veterinary work. I think that he enjoyed every minute of it and he was prepared to give of his service at any hour. He kept abreast of modern developments and he was endowed with an abundance of good common sense and sound judgment, and consequently he was held in very high regard by his clients.

Harry Sparrow came of a long line of men who had practised the veterinary arts. Most of his forebears had been in practice and in Essex the name

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Current Literature—*Concluded.*

The current trend in small-animal practice towards the treatment of the smaller cage birds is recognised by the inclusion of two papers on their diseases.

The first is of mainly practical clinical value on handling, observation of symptoms, surgical and medical treatment and the other, which is complementary to it, concentrates on *post-mortem* findings.

New techniques in small-animal surgery and anaesthesia are given a large place in the congress proceedings. Some of them were illustrated by films which doubtless added to their value at the time but now limit the information contained in the report.

Extraction of the lens in the dog, spinal anaesthesia, Boyle's anaesthetic apparatus and a discussion of anaesthesia and respiratory function are grouped together in an earlier section and the treatment of malunion fractures of the radius and ulna and some brief comments on various small pieces of surgical apparatus are discussed later.

It is unfortunate that the paper on prostatectomy in the dog was not apparently received for publication.

The next general theme to receive attention is that of diagnosis and the report includes papers and discussions on laboratory aids, biopsy technique and recent advances in several specific subjects, *e.g.* pseudo-Hodgkins disease, hip displasia, urography and smear diagnosis.

This type of discussion is most welcome for its amplification of the earlier theme on current research and for its tendency to increase the mutual understanding and co-operation between the clinician and the research worker. Advances in therapeutics have a place in the report and the paper concentrates on the cortico-steroid group. There is a fairly wide review of the production actions and uses of this group of drugs and the paper is noteworthy for its cortical assessment of their possible clinical value. It is accompanied by a series of photographs illustrating the technique of intra- and peri-articular injection.

A paper on diseases of the anterior segment of the eye follows and this is of course to some extent complementary to the earlier one on extraction of the lens.

The final papers and discussion cover the design and equipment of small-animal premises and, lastly, a discussion on fees.

The remainder of the report is taken up by the routine of the association's A.G.M.

Looking back over the report as a whole it may be said that the variety of interests within the orbit of small-animal practice has been widely catered for within the time available for a week-end congress. If the B.S.A.V.A. can maintain their early high standard throughout succeeding Annual Congresses these reports will become an essential item of reference for both students and those in small-animal practice and may be read with interest and benefit by many others in allied fields.

Sparrow is almost synonymous with the appellation "Veterinary Surgeon." Sparrows had practised at Rayleigh, Rochford, and Chelmsford for a period beyond any living memory. His father and grandfather practised at Rochford and his son Leonard remains to carry on the family tradition. The family has been blessed with long life. His father, Henry, took an active interest in the practice when he was 90 years of age and his uncle Martin was constrained to give up hunting when he was well over 80 years of age, only because of failing eyesight.

By his character and competence and good service to his fellows Harry Sparrow made his mark in his native county and brought prestige to his profession. We extend our deepest sympathy to Mrs. Sparrow and her family in their great loss with the hope that the knowledge that Harry Sparrow was held in such high regard by his friends, both in and out of the profession, will comfort them in their time of sorrow.

NEW ARBITRATION ARRANGEMENTS FOR ANIMALS AND POULTRY SLAUGHTERED UNDER THE DISEASES OF ANIMALS ACT, 1950

Changes in the arrangements for arbitration in connexion with compensation payable for the slaughter of stock will come into operation on September 1st, 1959.

Arbitration is sometimes required to settle the value of stock slaughtered in connexion with foot-and-mouth disease, fowl pest, and atrophic rhinitis, and for pigs slaughtered for diagnostic purposes where swine fever is suspected.

As from September 1st, the President of the Chartered Auctioneers' and Estate Agents' Institute may be asked to appoint an arbitrator for cases in England and Wales, when the stock valuation made on behalf of the Ministry is unacceptable and agreement cannot be reached about the appointment of an arbitrator. In Scotland, the President of the Institute of Auctioneers and Appraisers may be asked to make such an appointment.

The arbitrator is also given power to apportion the costs of the reference to him. In the past the Ministry has paid all the costs if any increase in the valuation was awarded. Similarly, the owner of the animals or poultry has been liable to pay all costs if the valuation was confirmed.

The changes are given effect by The Diseases of Animals (Ascertainment of Compensation) Order, 1959 (S.I. 1959 No. 1335). Copies are obtainable from H.M.S.O. price 3d. (by post 5d.).

INTERNATIONAL ASSOCIATION OF SMALL-ANIMAL SPECIALISTS

A meeting of veterinary surgeons interested in the formation of an International Association of Small Animal Specialists (I.A.S.A.S.) took place in Room I of the Congress Hall, Faculty of Law, Madrid University, Madrid, at 5 p.m. on Tuesday, May 26th, 1959. Thirty-two delegates were present representing 9 countries.

Mr. W. Brian Singleton, London, who had been appointed provisional secretary of the proposed I.A.S.A.S. in 1956 assumed the Chair and gave a brief résumé of the support which the idea had received during the past 3 years. He mentioned that early enquiries into the possibility of forming a small-animal specialist association had received a favourable response and, as a result, several countries had formed national groups. Denmark, Norway, Sweden, and Finland had formed a Scandinavian Small Animal Association, with 250 members under the Presidency of Dr. Moltzen, Copenhagen. Japan now had an association of 100 members, and Britain had established the B.S.A.V.A. with a total membership of 450. To these could be added the support of the American Animal Hospital Association with 700 members and also the small-animal associations of France and Holland.

Mr. Singleton pointed out that it had not been possible to create a definite organisation until the Permanent Committee of the International Veterinary Congresses had agreed to "sectionalise" the Congress and also until a representative number of people could meet. The Permanent Committee had now considered the affiliation of specialist groups and a small-animal section was listed. The rules governing affiliation with the I.V.C., together with the proposed statutes, were circulated to those present.

After discussion it was agreed that the establishment of the I.A.S.A.S. was desirable and Mr. G. N. Henderson, Great Britain, proposed that Dr. Wayne Riser, U.S.A., be elected President of the Association; this was seconded by Dr. R. Ruggles and carried unanimously. Mr. W. Brian Singleton was elected Honorary Secretary of the new Association. A temporary Committee composed of a delegate from all the countries represented at the meeting was elected as follows:—

Dr. Magrains	U.S.A.
Dr. Moltzen	Denmark
Dr. Meynard	France
Dr. Westerman	Holland
Dr. Mantevani	Italy
Dr. Berg	Norway
Mr. Dall	Britain
Dr. Alexander	Mexico
Dr. Amarques de Almeida	Portugal

After further discussion it was agreed that in the first instance the main functions of the new Association would be to encourage an exchange of publications, congress proceedings, films, and tape-recordings; that the Association should consider producing a bulletin and compile a list of veterinary interpreters; finally that the Association should co-operate with the Permanent Committee of the International Veterinary Congress in connexion with the programme of the next I.V.C. in so far as it concerned small-animal veterinary science.

Many of the delegates present contributed a small sum of money to cover the expenses of the Association until the proposed statutes and a formal constitution could be agreed by all the countries concerned.

PERSONAL

Births

BENNETT.—On August 11th, 1959, to Sheila, wife of Peter H. G. Bennett, M.R.C.V.S., of Penzance, Cornwall, a son.

NISBET.—On August 11th, 1959, to Joan, wife of Donald I. Nisbet, PH.D., B.SC., M.R.C.V.S., 10, March Road, Blackhall, Edinburgh, a son.

OLIVER.—On August 10th, 1959, at 168, Thames Side, Laleham, Middlesex, to Evelyn, wife of John J. Oliver, B.VET.MED., M.R.C.V.S., a daughter, Clare Margaret, sister to Helen.

Marriage

HEARD—SHEPHERD.—The wedding between Terrence W. Heard, B.A., VET.M.B., M.R.C.V.S., and Rosamond Shepherd took place at Portskewett, Monmouthshire, on Saturday, August 1st, 1959.

Death

ENTWISTLE, Alan Keith, of 80, Alexandra Road South, Manchester, 16. Qualified June 26th, 1959, at Cambridge, as recorded in column two, and admitted to hospital on the same day. Died August 19th, 1959, aged 24 years.

COMING EVENTS

August

30th to 5th September. 77th Annual Congress of the British Veterinary Association in Folkestone. (Official opening Monday, August 31st.)

September

9th (Wed.). Meeting of the Lincolnshire and District Division at the Berkeley Hotel, Doncaster Road, Scunthorpe, 2.15 p.m.

16th (Wed.). General Meeting of the South Wales Division at Aberystwyth, 2.15 p.m.

23rd (Wed.). General Meeting of the Lancashire Veterinary Association, Patton Arms, Warrington, 7.45 p.m.

24th (Thurs.). Meeting of the Supplementary Veterinary Register Division at 7, Mansfield Street, W.1, at 3 p.m. Committee meeting at 2 p.m.

25th (Fri.). Meeting of the North Wales Division at the Department of Agricultural Chemistry, Bangor, 2 p.m.

30th September, 1st and 2nd October (Wed., Thurs. and Fri.). Quarterly Meeting of Council, R.C.V.S.

UNIVERSITY NEWS

Bristol

First Examination for the Degree of B.V.Sc.
June, 1959
PASS

Grant, Elspeth Jessie; Kuhne, Karl John; Miles, John Lionel; Steadman, Maureen Mabel.

Second Examination for the Degree of B.V.Sc.
June 1959

Graham, John; Baker, John Rendle; Bray, Nicholas; Edwards, John Christopher; Gould, Leslie Alan; Hall, Florence Elaine; Shepherd, David Arthur Llewellyn; Spiers, Robert Charles; Wilson, Michael Robert; Brodrick, Timothy William; Dando, Gaynor Gwynne; Gibbs, Christine; Higham, David Arthur; Trowbridge, David Anthony; Dear, John Patrick; Fagg, Royal Henry; Hill, Terence John.

Cambridge

Mr. David Ross, M.A., VET.M.B., M.R.C.V.S., who is a research student supported by the Animal Health Trust, has been awarded the Sir Henry Strakosch Memorial Trust grant for 1959 for travel in the Union of South Africa.

EXAMINATION RESULTS

Veterinary Examination, Second Part, June, 1959
Passed in all sections

O. F. Amor, B.A., Queens'; R. F. E. Axford, B.A., St. John's; B. Boswood, B.A., Jesus; A. K. Entwistle, B.A., Pembroke; R. H. Haydon Jones, B.A., Queens'; T. W. Heard, B.A., Jesus; J. McCaig, B.A., Trinity Hall; M. Philpott, B.A., St. Catherine's; A. M. Smith, B.A., Peterhouse; R. B. Whiteford, M.A., Emmanuel.

A. J. Bacon, B.A. (Gonville & Caius), passed in two sections out of three.

Veterinary Examination, First Part, June, 1959

A. L. M. Shepherd, B.A. (Fitzwilliam), passed in all three sections.

R. K. Medd, B.A. (Selwyn), passed in Veterinary Parasitology.

London

Veterinary Pre-Clinical Examination, Part I
(For Internal Students), July, 1959
PASS

Royal Veterinary College

Amos, Walter Frederick; Bennett, Richard Jefferey; Brammer, Ashley; Buck, Nicholas Guy; Chesney, Christopher James; Chubb, Christopher Hugh; Davies, John Huw; Dix, Kathleen Mary; Eddy, Roger Graham; Garner, Edward John Albert; Gething, David John; Granger, John Christopher Parlane; Green, Colin James; Grimes, Terence Dudley; Grocock, Warwick John; Hart, Robert; Insch, Charles Geoffrey; Jones, Graham; Jones, Richard John; Jordan, Clive; Kendrew, Peter Charles; Knight, Lawrence; Lewis, Leon Sidney; Livingston, Alexander; McDowell, Elizabeth Mary; Mackendrick, Malcolm Douglas; Malone, Keith Stanley; Michell, Alastair Robert; Newns, James Lawrence; Okon, Effiong Essien; Onyait, Stephen Ezekiel; Parker, John; Pay, Michael Geoffrey; Piggott, Shelagh Frances; Poole, Anthony Henly Gundry; Rudge, Peter; Saxton, John George Gowland; Sisson, Helen; Smith, Anthony Frederick; Stephens, Dorothy Anne; Stevenson, Alan John; Stuart-Smith, Laurence Merriam; Stubbs, George Nicholas Lloyd; Tee, Roger David; Townley, David Brian; Watton, Ronald Frank; Webster, John Michael; Woodyer, Peter John William; Youngman, John Frederick Hewett.

Letters to the Editor

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

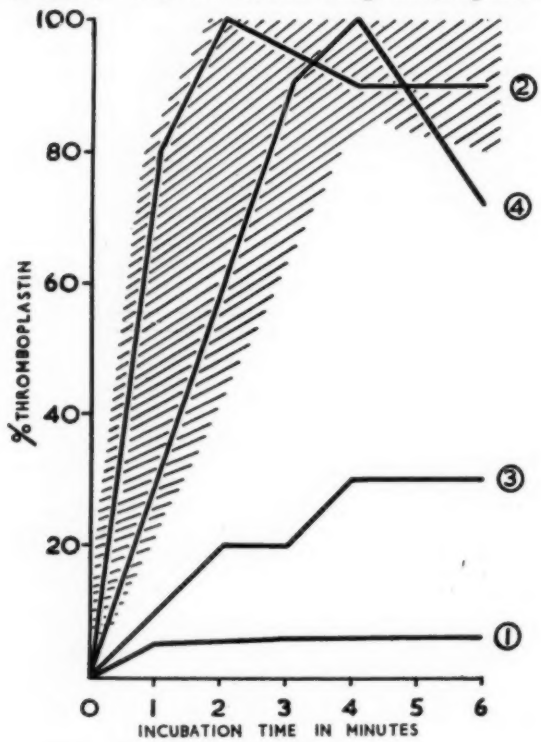
SCIENTIFIC

A Case of True Haemophilia in a Labrador Dog

Sir,—A Golden Labrador dog, aged 5 months, was referred to us by Mr. A. P. Phillips, M.R.C.V.S., for an opinion because it suffered from undue haemorrhage after a tooth extraction and also after several minor traumatic accidents which would be entirely insignificant in the normal dog.

Haematological examination of the circulating blood did not reveal any significant abnormality except for a neutrophilia (13,000 segmented neutrophils per c.mm.) nor was there any deviation from the normal serum protein pattern.

Coagulation findings were as follows: The Lee White Test (whole-blood clotting time) gave a mean reading of 35 minutes. The Quick 1-stage "prothrombin" time was normal using thromboplastin of canine brain origin. It was also normal using Russel Viper venom as a thromboplastic source both with and without added lipid. Clot retraction was 35 per cent. and the platelet count was 350,000 per c.mm.



Curve	*Addition*	*Source of:— absorbed plasma*	*serum*
(1)	Nil	Patient	Patient
(2)	Nil	Normal	Patient
(3)	Nil	Patient	Normal
(4)	A.H.G.	Patient	Patient

The shaded area represents the approximate limits of normality.

FIG. 1.—Thromboplastin generation tests in a haemophilic dog.

The thromboplastin generation test of Biggs and Douglas (1953) revealed a clear-cut picture of true haemophilia A (deficiency of antihaemophilic globulin), since the gross inability of the patient's plasma and serum to generate thromboplastin was shown to be attributable to the aluminised plasma fraction (Fig. 1). Further, addition of antihaemophilic globulin of equine origin, prepared by the method of Biggs and MacFarlane (1957), to the patient's system gave complete correction. The coagulation methods used have been described in detail in another publication by one of us (Archer, 1959).

True haemophilia has been reported previously in dogs (Brinkhous & Graham, 1950; Field *et al.*, 1946; Graham *et al.*, 1949; Hutt *et al.*, 1948). These authors consider that the mode of the inheritance of the disease is similar to that in man; *i.e.* haemophilia A depends upon a sex-linked recessive factor carried on the X chromosome.

Brinkhous and Graham (1950) reported the existence of haemophilia in female dogs as a result of experimental mating between an affected (homozygous) male and a heterozygous female. Of the female puppies born about 50 per cent. were true cases of haemophilia A and 40 per cent. of these died within the first 2 weeks of life. These authors found it experimentally possible to rear affected dogs to breeding age by repeated transfusions of normal plasma to control the haemorrhagic tendency.

It is a reasonable hypothesis that many haemophilic pups die within the first few weeks of life, although it must be emphasised that we have no factual evidence of this at present. This might be part of the explanation of the rarity of reports of the condition in dogs. We are at present engaged with Mr. Phillips in further work on haemophilia in dogs with whom we hope to publish in due course full clinical histories of this and other cases.

Yours faithfully,

R. K. ARCHER.

Equine Research Station of the Animal Health Trust, Newmarket.

R. S. T. BOWDEN.

Canine Health Centre of the Animal Health Trust, Kennett.

August 11th, 1959.

References

ARCHER, R. K. (1959). *J. comp. Path.* In the Press.

BIGGS, R., & DOUGLAS, A. S. (1953). *J. Clin. Path.* **6**. 23.

———, & MACFARLANE, R. G. (1957). "Human Blood Coagulation and its Disorders." 2nd edition. Blackwell. Oxford.

BRINKHOUS, K. M., & GRAHAM, J. B. (1950). *Science.* **111**. 723.

FIELD, R. A., RICKARD, C. G., & HUTT, F. B. (1946). *Cornell Vet.* **36**. 285.

GRAHAM, J. B., BUCKWATER, J. A., HARTLEY, L. J., & BRINKHOUS, K. M. (1949). *J. Exp. Med.* **90**. 97.
HUTT, F. B., RICKARD, C. G., & FIELD, R. A. (1948). *J. Hered.* **39**. 3.

GENERAL

Veterinary Services in Saskatchewan

Sir,—A Veterinary Service District has been set up in the Maple Creek area, in the Province of Saskatchewan, Canada. The Veterinary Service District here consists of R.M.'s 110, 111, and L.I.D. 929. Approximately 50,000 cattle, 11,000 sheep, 3,000 swine, and 15,000 poultry are kept in this area, of 54 townships.

In case you are not familiar with the operation of a Veterinary Service District, I will mention a few of the important points. In the case of this district, a $4,000 grant is paid to the practising veterinarian. Half of this is from the three local units and the other half from the Saskatchewan Department of Agriculture. This grant is intended to cover the mileage charges to farmers and ranchers in the three units only. The veterinarian would receive his regular fees for service and drugs in the area. He could also work outside the district when there was no urgent work to do in the Veterinary Service District. For this work he could charge mileage at a rate of 50 c. per mile.

The nearest private practitioner to Maple Creek at the present time, is in Medicine Hat, roughly 60 miles away to the west, and at Shaunavon roughly 85 miles to the south-east. There is one Health of Animals veterinarian in Maple Creek, and one or more at Medicine Hat and Swift Current. There is also a private practitioner at Swift Current which is roughly 90 miles from Maple Creek. There is no veterinarian south to the U.S. boundary, and north at least as far as Rosetown. This will give you some idea of the size of the area a veterinarian could consider as his district. The Agricultural Representative district that I service contains roughly 94,000 head of cattle, 34,000 head of sheep, 8,500 swine, and 43,000 poultry.

It is estimated that a veterinarian could gross at least $13,000 per year, $4,000 from the grant, and $4,000 from calls. In addition to that roughly 10,000 head of calves are vaccinated for Bang's disease each fall. The veterinarian receives 50 c. for each calf vaccinated from the Provincial Government. He also charges each farmer or rancher 75 c. for each of the first 10 head vaccinated in their premises. In other words at least $5,000 should be made from this work.

The present Health of Animals veterinarian is not able to do all the testing and other work in connexion with the movement of cattle to the United States, Ontario, Alberta, etc. He is also carrying on a TB.-testing programme for the Canada Department of Agriculture. Dr. V. E. Senior, Provincial Veterinarian, informs me that veterinarians in Veterinary Service Districts are encouraged to take part-time work with the Health of Animals Division. This would be additional revenue, and of course the veterinarian would be free to handle vaccines, drugs, and other supplies to sell to farmers and ranchers.

As you probably know, the Canada Department of Agriculture Health of Animals Division is responsible for Bang's testing all cattle in Canada. The area around Swift Current is under test at the present time. I believe that if there were sufficient staff available, that the area from Swift Current west to the Alberta boundary would be gazetted. This would make additional work for a man in the Maple Creek district. Tests have already indicated that the disease is prevalent.

I would appreciate having you find out if there are veterinarians in the United Kingdom who are interested in coming to this area. As you probably know, Dr. V. E. Senior took his training there. Dr. J. Tanner, who is in the Norquay district, is also from overseas and his brother has just started to work with the Health of Animals Division at Swift Current. There are a number of others who have recently come from overseas and established practices in this province. If you find anyone who is interested, I am sure that Dr. Senior, the other two veterinarians I mentioned, and myself would be glad to answer any questions. I would certainly like to have a veterinarian by September or October in order to start the calfhood vaccination programme on time.

I might add that the town of Maple Creek is near the Junction of Highways No. 1 and 21, has a population of about 2,000, has running water, gas, and other modern conveniences. Hospital, school, and other facilities are quite satisfactory.

Yours faithfully,
J. I. CLARK,
Agricultural Representative.

Department of Agriculture,
Agricultural Representative Services,
Maple Creek, Saskatchewan,
Canada.

July 17th, 1959.

[*Editor's Note:* This letter was addressed originally to the Board of Trade, but having come to THE VETERINARY RECORD *via* the R.C.V.S., it was felt of sufficient general interest to reproduce in full.]

Correction of a Twisted Gut in a Cow

Sir,—We wish to record the successful correction of a twisted gut in a cow.

Diagnosis. The cow showed signs of colic. She had a temperature of 102.2° F. On rectal examination the caecum was found to be grossly tympanitic. Pressure on the caecum increased the colic. Obstruction of the large intestine was diagnosed, one of the possible causes being a twisted gut.

Correction. The site of operation was a point on the right flank midway between the coxal tuber and the last rib, about a handsbreadth below the line of transverse processes of the lumbar vertebrae, extending vertically downwards for 8 inches.

Anaesthesia. Paravertebral. The animal was standing.

Operation. The abdomen was opened. The twisted gut was found, and the extent and direction of the twist identified by the tympanitic condition of the enmeshed coils—the terminal portion of the gut and mesentery had twisted over itself (clockwise if viewed from the head) completely blocking the caecum. The grossly distended caecum was wedged in the pelvic

brim and its size prevented any detailed examination or manipulation. The caecum was brought out, opened, emptied, and sutured with No. 2 chromic catgut. This did not reduce the distension of the other parts of the intestine involved. The extent of the twist was re-examined and what was thought to be the terminal portion identified. Whilst the caecum was held in its normal position by one of us as a fulcrum, this inflated portion was rocked and suddenly turned. The flatulence dispersed. Faeces and gas were passed *per rectum*. The caecum appeared now to be in its normal position, the obstruction removed. The abdominal wall was then sutured as in a rumenotomy. 5,000,000 units of penicillin and 5 g. of streptomycin were injected intramuscularly. This was repeated on the next day.

Sequelae. Four days later the animal developed nervous acetonaemia which was treated by an intravenous injection of calcium, magnesium, and glucose (M.F.C. May & Baker), and glycerine and magnesium carbonate *per os*. Skin sutures were removed on the 11th day. The animal has remained in good health ever since—*i.e.* for over 4 months. This was the fourth attempt to perform such an operation.

Case 1. The twist was inspected but involved most of the intestine. No correction was attempted.

Case 2. The obstruction was apparently where the double coil folds back on itself centrally in the mesentery. No obstruction was found a.m. or p.m., but the "tympany" did not respond to treatment. When slung after slaughter the carcase passed faeces and gas.

Case 3. The twist was inspected and involved most of the intestine. The attempt to correct it failed, the large intestine being ruptured. The animal was slaughtered.

The earlier the operation is carried out the greater the likelihood of correction, since the twisted gut rapidly fills with gas. The coils of colon in the mesentery are very friable and should be handled as little as possible. Although not attempted in these cases, we are of the opinion that in this operation an approach from both flanks should be made. The increased risk is so slight compared with the certainty of knowing what and where the obstruction is, and of facilitating manipulation by two operators.

Yours faithfully,

10/12, Landguard Road, Southampton, Hants.
G. N. GOULD,
C. M. GOULD,
A. C. GOULD,
T. MORROW.

August 15th, 1959.

Parasitic Bronchitis: The Vaccinated Calf as a Carrier

Sir,—If the resistance which follows vaccination is not sufficient to protect completely against natural infection, such an infection may produce carriers which are a danger to healthy stock. Recent experience suggests that this may be the case with the irradiated larval vaccine for husk.

Observations are in progress on farms associated with this Field Station to determine the serological response of calves vaccinated with X-irradiated larval vaccine.* On one farm 18 animals varying in age from 2 to 6 months, which had been kept indoors since birth, were vaccinated with a double dose of vaccine, and turned out to grass 4 or 5 weeks after the second dose. In order to study at close hand the effect of challenge of the vaccinates, 4 of them were removed to the Field Station. On arrival, faeces samples examined by Baermann separation were negative for lungworm larvae, and the calves were put onto a reseeded lungworm-free pasture along with 6 unvaccinated calves 3 to 4 months old, reared indoors at the Field Station. When a second faecal examination was carried out 10 days later, 2 of the vaccinates were found to be excreting small numbers of *D. viviparus* larvae. After a further 3 and 10 days, respectively, the other vaccinates were also excreting larvae. Thirty-one days after the introduction of the vaccinates to the lungworm-free pasture, larvae began to appear in the faeces of the unvaccinated calves, and both vaccinated and unvaccinated calves were coughing. The time interval between the 4 calves being first turned out to pasture on the farm of origin and the detection of larvae in their faeces was 28 to 45 days, which would suggest that infection was acquired there.

The history of this pasture is that a clinical outbreak of husk had occurred on it 3 years previously and it was being grazed by young adult stock when the vaccinates were turned onto it. This situation would not be expected to produce a high level of infective larvae on the pasture and yet all 4 vaccinated calves removed to the Field Station were excreting larvae and subsequent examination showed that 3 of the remaining vaccinates on the farm and the control unvaccinated calf running with them, all showed evidence of infection.

This finding suggests that the protection afforded by vaccination may not always be sufficient to prevent a natural infection which may proceed to the patent stage, with or without clinical symptoms, and result in the excretion of larvae in the faeces. Such calves are a potential source of infection to unvaccinated stock, and our experience shows that they can infect a clean pasture. The existence of this risk needs to be appreciated. Further study is required to determine how commonly vaccinated calves become carriers when exposed to natural infection. Jarrett *et al.* (1959) did not find any larvae in the faeces of calves challenged with 10,000 virulent larvae, after receiving a double dose of vaccine. Is it possible that the effects of exposure to an infected pasture differ from experimental challenge with a single large dose of larvae?

The writer wishes to thank Messrs. Allen & Hanburys Ltd. for supplies of "Dictol," Mr. J. F. Michel for kindly confirming the identity of *D. viviparus* larvae, and the A.R.C. who are supporting the main part of this work.

Yours faithfully,

R. L. CORNWELL.
Department of Veterinary Preventive Medicine,
University of Liverpool, Field Station,
"Leahurst," Neston,
Wirral, Cheshire.

August 6th, 1959.

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* "Dictol," Allen & Hanburys Ltd.